Vol. XXV. Part 10.

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The Journal of the Department of Agriculture of Victoria, Australia.

October, 1927.

PRINCIPAL CONTENTS

Accuracy in Yield Trials
Colic in Horses
Grafting of Deciduous Fruit Trees
Report of Plant Pathologists' Conference
Orchard Practice in the Control of Pests
Picking and Packing Tomatoes
Potato Experiments

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OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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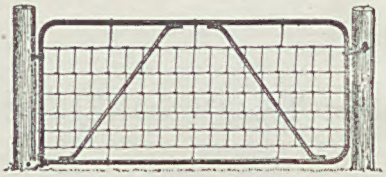

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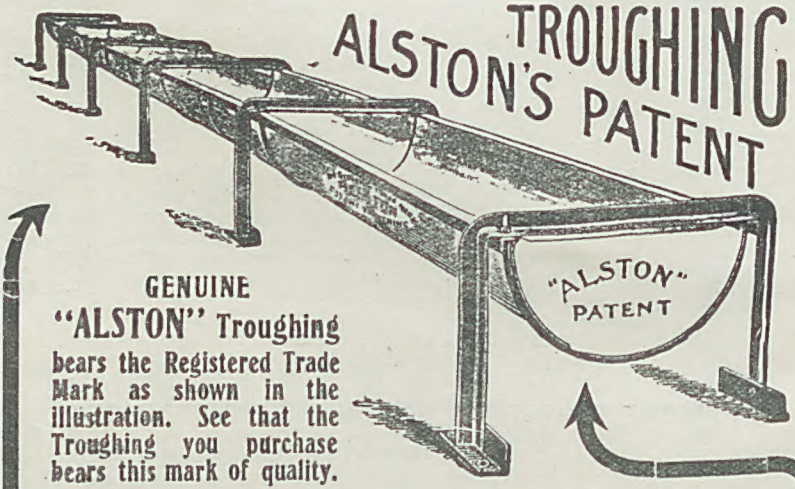

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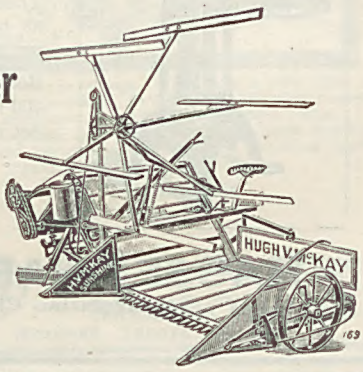

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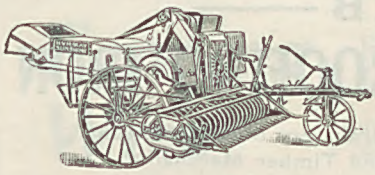

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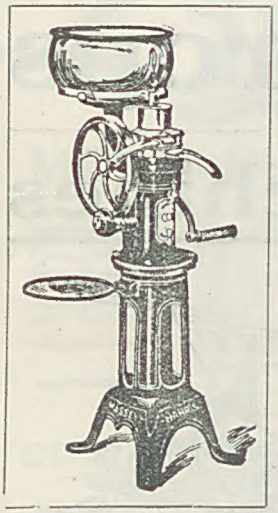

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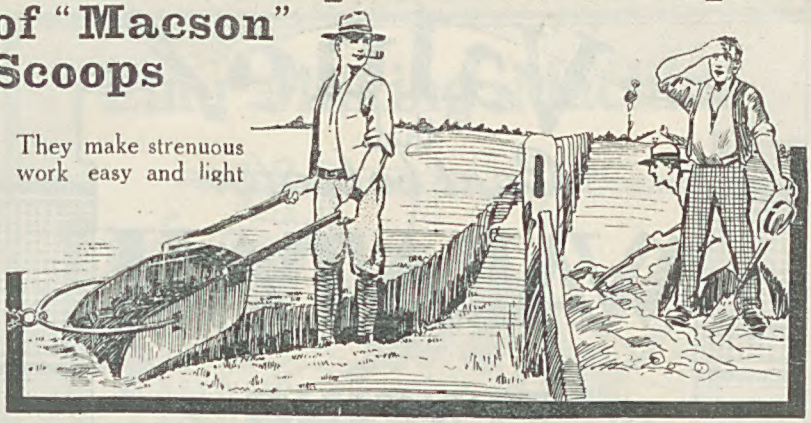

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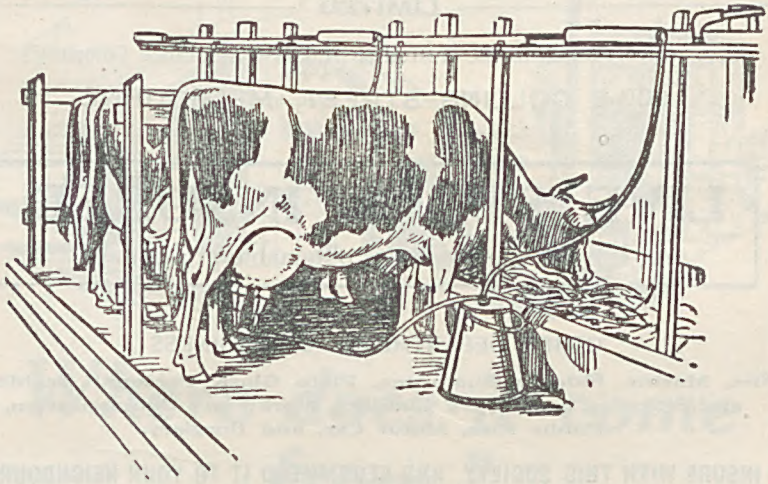

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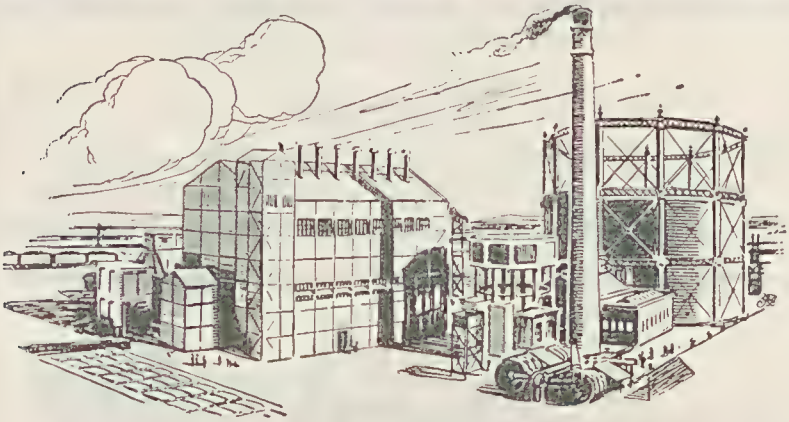

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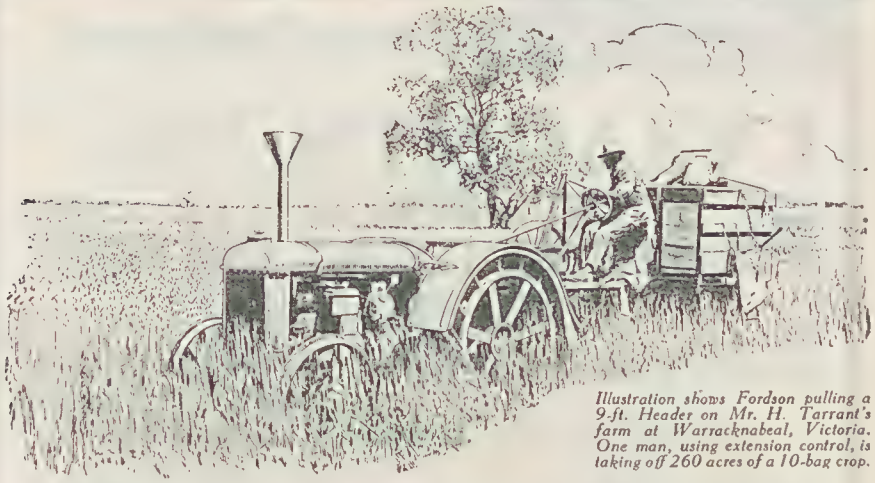

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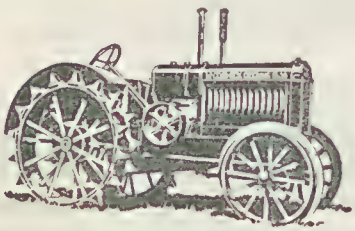

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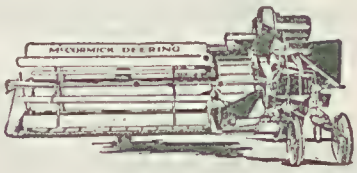

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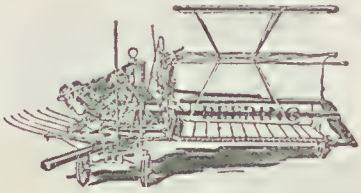

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ACCURACY IN YIELD TRIALS.

H. A. Mullett, B.Ag.Sc., Superintendent of Agriculture.

To compare the yields of two varieties of wheat or, say, the effect of two fertilizers on oats, nothing seems simpler than to choose a uniform field for each crop and lay out a couple of large plots, say, an acre or so each in area. Where more comparisons are needed other plots could be added, with two or three check plots to take care of any soil variations.

That method—the single-plot system—has been practised for more than 100 years, but any one who takes a critical view knows that it cannot be relied upon to give results closer than 15 to 20 per cent. of the truth, unless the check plots disclose most unusual uniformity and the experiments have been conducted over a considerable number of years. The variations in the yields of check plots situated a few chains from each other is notorious. Most workers have averaged the yields of check plots to determine the zero line of their calculations, or else have assumed a steady variation in the yielding capacity of the soil between the check plots. Both practices are obviously unscientific. Despite the imperfect experimental technique, the single-plot tests have furnished valuable information, more especially where it has been possible to obtain corroborative evidence from similar tests laid down in several other localities, or as in the case of the use of superphosphate in this country, where the effects of an application of the manure are so marked that they are obvious despite the inherent variation between the yielding capacity of the soil.

Comparatively recently field trial technique has been so improved that it is now possible to obtain comparisons accurate to 2 or 3 per cent. for the conditions of the test, and, moreover, to ascertain the degree of accuracy obtained. The new methods were evolved from investigations carried out during the past decade. The most widely known of these was begun at Rothampstead fifteen years ago by Hall and Mercer. They chose an apparently uniform acre of wheat and divided it up into 500 parts. The produce from each of these was weighed, and it was

ascertained that instead of the yields of the units being uniform with that of the whole field, they varied considerably; in fact, there were variations all the way from 20 per cent. below the mean to 20 per cent. above the mean. From this it was obvious that the weight of a single plot, or even the average of two, was not a reliable indication of the average yield of the acre. Hence it became apparent that in designing an experiment it is most important to choose sufficient plots to obtain an adequate sample of the whole, and that to choose one would be parallel to the blind-fold picking out of a man in a crowd and regarding him as typical of all men in respect of height or wealth. Just as the average wealth of men in a town can only be ascertained by selecting at random a reasonable number of men as a sample, so in determining the yield of any particular crop it is necessary to obtain a sufficient number of representative units.

A further study of the yields of the small plots in the acre of wheat surveyed revealed the fact that the variation was such as may be expected when it arises from the interplay of a large number of chance factors. It so happened that statisticians had evolved certain formula governing the rules for obtaining reliable samples in such circumstances, and these have now been availed of by scientific workers in agriculture in designing field experiments, as also has the statisticians' method of ascertaining the limits of accuracy of his results. Once the variable nature of the units which go to make up the yield of crops was realized, a very definite step forward could be made. It was simply a matter of ascertaining the size of the plot or sample most convenient and accurate, of determining the best shape of the plots, and when that had been done, the required number of the samples of each kind of plot to give the degree of accuracy required. In ascertaining the most accurate sized plots the yields of the unit plots, one five-hundredth of an acre, were combined, two at a time, three at a time, and so on, and the " probable error " determined for each case. In like manner the best shape for plots was deduced. Hall and Mercer's conclusions were briefly these—

> " (1) On all field trials, however uniform the land and careful the management of the experiment, there will be an experimental error attaching to the result, due to so many incalculable factors that it may be described as casual.
>
> " (2) The error diminishes with the size of the plot, but the reduction is small when the plot gives above one-fortieth of an acre.
>
> " (3) The error may be best diminshed by increasing the number of plots similarly treated, and scattering them about the area under experiment, but there is not much to be gained by increasing the number of the plots above five.
>
> " (4) For practical purposes the authors recommend that in any field experiment each unit of comparison (variety, method of manuring, &c., according to the subject of the experiment) should be given five plots of one-fortieth of an acre each systematically distributed within the experimental area."
>
> " This will reduce the experimental error to within 2 per cent. of the result, if the land is at all suited to the experiment; it does not eliminate variations due to the unequal effects of different seasons upon the varieties, or the action of the manures under

experiment. Such variations can only be eliminated by continuing the experiment for several years. Similarly, variations induced by the type of soil can only be ascertained by repeating the experiment on several soils."

Until recently the single plot system, or modifications of it, was practically the only method of conducting yield trials in this country, and it has been argued that experimental fields, more especially in the wheat belt, were much more uniform here than in Europe. Recent work for the Department conducted at the Research Farm, Werribee, by Messrs. H. C. Forster and A. J. Vasey, has discounted that. Their paper "Experimental Error in Yield Trials," communicated to the Royal Society recently, which confirms the Rothamstead results under the conditions that obtain at the Research Farm, Werribee, has already led to extensive trials of scientifically designed plots, five times replicated being undertaken there, and at other State institutions. The laws of accurate sampling require the plots to be scattered at random over the field, but, except for very small plots, when large numbers of replicates are used and hand harvesting essential, true random scattering of the plots is inconvenient. A very practicable layout has been evolved by Dr. Beavan, of Warminster, England. Briefly, for variety trials it consists of using a seed drill subdivided into two parts, one for the new variety and one for the standard variety. The pair are sown in one-fortieth acre plots in the one operation, and the pairs repeated five to eight times. The arrangement for, say, Free Gallipoli and Federation five times replicated, is as follows:—Federation, Federation-Free Gallipoli, Free Gallipoli-Federation, Federation-Free Gallipoli, Free Gallipoli, Free Gallipoli-Federation-Free Gallipoli, Federation. The first and last plots of Federation act as buffer plots. By placing the pairs of plots in close proximity to each other paths and path effects are practically eliminated. The produce is cut with a binder and threshed. It will be noticed that the order of the plots is alternated. This is to overcome any steady soil variation. Beavan claims for his method a probable error of 1 to 2 per cent. in any given year. Before finally adopting this system extensive trials of this method, and modification of it, have been undertaken at the Central Research Farm, at the Rutherglen Experimental Farm, and the departmental plots, Longerenong. At Longerenong two adjacent plots were sown to the same variety. As this can be done with one "round" of the drill it is a very convenient arrangement, and will permit of the calculation of the pairs as regularly alternating. When the results are available they will be published in this *Journal*.

Incidentally, regarded statistically, the single plant selection in rows which is so commonly practised, does not appear in a very satisfactory light. Dr. Beavan has calculated that "with 12 square inches of soil space per plant, and with all the plants of the same race, and comparing adjoining plants, the differences run from zero up to quite an indefinite maximum. The probable error of the percentage difference is somewhere about 80 per cent. of the average weight of the two adjoining plants. A difference of 300 per cent. between them is therefore not conclusive evidence of any racial difference, but may be due to conditions external to the plant. The probable error is much greater even than this for single plants under field conditions, with necessarily

wide differences in soil space per plant. It follows, therefore, that it is practically impossible to select single plants for racial productivity. Incidentally, also, it stresses the great difficulty, if not impossibility, of adapting plot culture methods to estimates of productivity, except in respect of very great differences."

These views appear to square with the general experience, and general acceptance of their truth should lead to radical alteration in field experimental technique.

COLIC IN HORSES.

By R. J. de C. Talbot, B.V.Sc., Veterinary Officer.

Colic is probably the commonest disease of the horse, and is responsible for a large number of deaths annually. If it is recognized in its early stages and correct treatment adopted, the animal usually recovers.

Although so common, most horse-owners appear to have a very vague idea as to its cause or the treatment required, and, as a consequence, horses are made to suffer much unnecessary pain both from the disease itself, and often from the remedies administered, in all good faith but with no knowledge as to either their effect or the complaint they are intended to cure.

First, we must understand that "Colic" is a term which is used in a very wide sense to describe a series of symptoms which are manifestations of pain in the abdomen. These pains are due in the majority of cases to some disarrangement of the digestive organs; in short, the main predisposing cause of Colic is indigestion.

There are, of course, special forms of Colic caused by hernia, calculi, intersusception of the bowel, &c., but I do not propose dealing with them in this article.

Most disarrangements of the digestive organs are due primarily to errors of diet, and if owners would pay more attention to this most important subject in regard to their horses, very few cases of Colic would occur. There are a few simple rules of feeding and watering with which every horse-owner should be familiar and to which he should rigidly adhere.

Let us deal first with watering. Horses require from 7 to 15 gallons of water per day. That water should be the purest it is possible to obtain, because it is just as essential for a horse to have pure water to drink as it is for a man. Water containing a large amount of sediment should no no account be given; it is often the cause of sand accumulating in the intestines, and this, besides causing debility, may induce attacks of Sand Colic. Horses should always be watered before being fed. The reason for this is that the horse's stomach is a comparatively small organ, and if the animal is given feed while it is thirsty and then given a drink afterwards, the water will wash a considerable portion of the undigested food particles into the intestines, and indigestion and possibly Colic will be the result.

One often hears it said that a horse should not be allowed to drink when brought in hot after a hard day's work, but this is absolutely incorrect; he should always be allowed to drink before any food is

given to him. After a long fatiguing journey, possibly the best way is to permit the horse to have a drink about a mile from the journey's end and then to take him slowly over the rest of the trip. The mistake in regard to watering in relation to feeding is one of the most frequent causes of Colic.

In feeding there are rules, most of them common-sense ones, which should always be observed if errors in diet are to be avoided.

Feed in small quantities and often.

Don't feed large quantities of food to which the horse is unaccustomed.

Don't work the animal immediately after a full feed.

To ensure perfect digestion, the food must be thoroughly masticated; this means that the teeth must be in good order. It is often found that animals which suffer from frequent attacks of Colic have teeth requiring attention. Therefore, in what might be termed chronic cases of Colic, a careful examination of the teeth should be made by a veterinary surgeon.

It is because of the relatively small size of the stomach that horses require to be fed small amounts often. Food is not meant to stay long in the stomach, but it should remain there long enough to permit it to undergo a certain amount of digestion. If a horse is kept without food for a long time and then allowed access to a large quantity, he will probably eat too much, and consequently the stomach becomes distended and correct digestion is impossible. Food will be forced in a semi-digested condition to the intestines where it will cause indigestion and probably Colic. Therefore, feed in small amounts as often as possible. Under ordinary working conditions a horse should have his daily ration spread over at least four feeds. Remember that under natural conditions the animals eat just as much as they want as often as they want it.

Horses should never be brought off the grass and put on to hard feed straight away. This is a common enough practice on some farms, and is a potent cause of colic; the change of feed should be made gradually, the amount of dry fodder being increased daily until the full amount is being given.

Another common cause of Colic is the practice of heavily feeding a horse for two or three days before he is required for some special work. This overloading the stomach with unaccustomed food usually results in indigestion and predisposes towards an attack of the disease. The feeding of mouldy chaff and hay is also a frequent cause of the trouble.

Horses should never be given very strenuous work immediately after a heavy feed. The reason for this is that during very hard work the digestive processes cannot go on as they should, so that indigestion must result.

These few hints I have mentioned in regard to dieting will, if carried out in a common-sense way, do quite a lot in lessening the occurrence of a disease which may become very serious. Probably the most common types of Colic met with in Victoria are:—Spasmodic Colic, Flatulent Colic, Wheat Colic, and Sand Colic. As the symptoms and treatment of these various forms vary quite a lot, it will be necessary to deal with them separately.

Spasmodic Colic.

In Spasmodic Colic, which is the most common form, the onset of the disease is sudden—it may even occur when the animal is working.

The first noticeable symptom is a general uneasiness, which is soon followed by spasms of acute pain. The pain is not continuous, and there are periods during which the animal appears quite normal. During the spasm the patient is usually very violent, it paws and kicks at itself, throws itself down, gets up suddenly and is continuually looking around at its flanks, sometimes biting at them; it breaks out in sweats either all over the body or in patches, the pulse is fast and the breathing jerky and hurried. The mucous membranes of the eyes and nose are red coloured. The temperature is usually normal.

As the disease progresses the intervals between the spasms become shorter and the symptoms of pain more acute—usually the bowels are constipated. As soon as the disease is recognized the animal should be well bedded down in a large loose-box and made as comfortable as possible. If the weather is cold the horse should be rugged. It is by no means necessary to keep it walking about as is sometimes done. These suggestions in regard to making the animal comfortable, &c., should be carried out in treating all forms of Colic. In the spasmodic form the following drench should be administered at once:—

Raw linseed oil—1 pint.
Aromatic spirits of ammonia—4 tablespoonfuls.
Sweet spirits of nitre—4 tablespoonfuls.

The ingredients should be well shaken up, and in giving the drench the greatest care and patience should be exercised to prevent any of the fluid going down the windpipe. On no account should the tongue be held while the animal is being drenched. Copious enemas of warm soapy water should be given hourly. If relief is not obtained an hour after giving the above drench it should be repeated, but gruel should be substituted for the linseed oil.

Flatulent Colic.

This is a common type of the disease, and is due to fermentation of undigested particles of food in the intestines. The symptoms are somewhat similar to those of Spasmodic Colic except that the spasms of pain are more continuous and the abdomen is very much distended with gas. This distention is most apparent in the region of the right flank and becomes more pronounced as the disease progresses. In some severe cases of the disease it is necessary to puncture the bowel to allow the gas to escape. The puncturing should be done with an instrument known as a trochar and canula. This consists of a hollow tube in which a sharp pointed piece of steel is fixed. The instrument is pushed through the skin and bowel-wall, the site for the incision being the highest point of the swelling in the right flank. The sharp pointed trochar is pulled out, and the tube is left in the opening for the gas to escape through. As soon as the disease is noticed the animal should be drenched with the following:—

Baking soda—1 cupful.
Warm water—1 quart.

Follow this in half an hour with—

Linseed oil—1 pint.
Turpentine—4 tablespoonfuls.
Lysol—1 teaspoonful.

Copious enemas of warm soapy water should be given every hour.

Wheat Colic.

In wheat-growing districts horses are frequently affected with Colic due to eating an excessive amount of wheat. This usually occurs when animals break into a shed or stack containing wheat. The symptoms of this form of Colic are:—First of all, the animal appears to be uneasy and has short attacks of pain, it throws itself down and rocks about. In a short time the pains become more severe, and the animal appears to be trying to vomit; it may sit up in a dog-like fashion, and gas escapes from the nostrils followed by a sour-smelling froth. If treatment is not quickly adopted, the animal will soon die, the immediate cause of death being rupture of the stomach.

Experiments conducted in regard to this disease at the Melbourne University Veterinary School proved that the most essential treatment was to give the animal large quantities of water. If it will not drink it should be drenched with water. Immediately the disease is noticed give the following drench:—

Baking soda—1 cupful.
Warm water—1 quart.
Follow this in one hour with—
Raw linseed oil—1 pint.
Turpentine—4 tablespoonfuls.
Lysol—1 teaspoonful.

As this form of Colic is frequently followed by an attack of laminitis or "founder," the animal, as soon as the colicky pains have ceased, should be stood in water up to the knees and allowed to remain there for some days. This will often prevent the occurrence of founder.

Sand Colic.

Several Mallee farmers have written to the Department and asked that some treatment for Sand Colic be suggested.

Sand Colic is very common throughout the Mallee, and is due to large accumulations of sand in the intestines. This, as one would expect, causes almost chronic indigestion, and the animal suffers frequently from violent attacks of Colic. Animals that are "sanded" are invariably in poor condition. The disease is very difficult to treat. The first thing to do to prevent the repeated attacks of Colic is to remove the sand from the intestines, and this is no easy matter.

I would suggest that the following simple treatment, which has proved effective in a great many cases, be tried:—

First drench the horse with a mixture of 1 *lb. honey and* 1 *quart of new milk. This should be followed by three daily doses of* 1 *pint of medicinal paraffin* (not kerosene). *Enemas of soap and water should be given every day, and, if possible, the animal should be on green feed both before and after the treatment is commenced.*

During the colicky attacks, the drench recommended for Spasmodic Colic should be given, that is:—

Raw linseed oil—1 pint.
Aromatic spirits of ammonia—4 tablespoonfuls.
Sweet spirits of nitre—4 tablespoonfuls.

Worms Sometimes the Cause of Colic.

Worms are sometimes the cause of spasmodic attacks of Colic. The commonest worm infesting horses is the large round white worm which may be up to 12 or 18 inches long. Horses infested with large numbers of these worms are usually in poor condition, and may be subject to frequent attacks of Colic.

The treatment for this type of worm is simple and usually effective. The horse should be given a bran mash overnight, and then no more feed until the following drench has been administered:—

Raw linseed oil—1 pint.
Turpentine—4 tablespoonfuls.

During administration keep the drench well mixed up.

ORCHARD PRACTICE IN THE CONTROL OF PESTS.

(By H. W. Davey, Chief Orchard Supervisor.)

For the better control of plant diseases, whether these consist of fungi or insects, the fruit-grower depends largely on the extent to which he practises what may be classed as "orchard sanitation." This orchard sanitation is of the first importance, if the trees are to be maintained in good health and the fruit kept free from blemishes.

Black Spot.

Clean cultivation is of very great assistance in controlling certain diseases as, for example, the fungus Venturia that causes the disease known as Black Spot of the apple and pear.

Prior to the fall of the leaf, this fungus has been living as a parasite on the leaves and fruit of both the apple and pear, producing the familiar Black Spot. On the fall of the leaf, however, the roots or mycelium of the fungus spread through the dead tissues of these fallen leaves. In the following spring this mycelium produces a reproductive part containing spores capable of starting a fresh infection of Black Spot, both on the fruit and leaves of the tree. Countless millions of spores may be liberated in spring from leaves of the previous autumn. This is where the benefit of clean cultivation comes in. Had these fallen leaves been ploughed under in the autumn, or very early in spring, and allowed to remain buried, they would have decayed and the fungus would have lost its host. Of course, it would be better still, if practicable, to rake up and burn all these leaves. If a second cultivation in spring is commenced before these leaves have decayed, it releases many of the spores of Black Spot. Actual experiments have shown that in orchards very subject to Black Spot, it is important that the land should not be again ploughed before October or November, as the longer the leaves are allowed to remain buried, the less chance is there of the buried spores being released.

Clean cultivation assists in the control of diseases other than Black Spot, since it is the means of suppressing weeds on which several diseases of fruit trees may flourish. Good cultivation, apart from conserving moisture, very materially assists in making soil nutrients available to the roots of the trees.

Another form of orchard sanitation lies in keeping the trees free from loose bark, fractured or broken limbs, as these form harbours for codling, scales, and other insects.

Shot Hole and Brown Rot.

Much useful work can be performed at pruning time, especially among stone fruits. In orchards where apricots have suffered badly from Shot Hole or Brown Rot, all shoots or twigs showing signs of having been attacked by fungi should be cut away and burnt, special attention being paid to those trees that had previously been attacked by Brown Rot. All mummy fruits should be carefully collected and burnt. These mummies carry millions of spores of the disease, and the longer they remain on the trees the more likelihood is there of the spores being carried about on the feet of birds and insects.

Headlands and channel banks should also receive attention. All weeds should be cleaned from them. In any case, these weeds should not be allowed to seed, as is often the case. Channel banks should be mown or burnt off, so as to prevent the accumulation of rubbish year after year, making breeding sanctuaries for the Rutherglen Bug and the Pea Mite, from which strongholds they later emerge to attack cultivated crops.

Shot Hole of the Apricot (*Coryneum beijerinckii*) is especially severe in its attacks some years. This destructive disease is best controlled by the Standard Bordeaux, viz., the 12—8—80 formula made in the usual manner, with 12 lb. bluestone, 8 lb. quick lime, in 80 gallons of water. The first application should be the winter or dormant spray, and the second spray should be applied at what is known as the pinking stage. The lime-sulphur spray should not be applied to apricots.

Brown Rot (*Sclerotrinia cinerea*).—For this disease on cherries, the first spray (with lime-sulphur, 1 in 10) should be applied before the buds open. A second spray (at a strength of 1 in 20) is given when about 10 per cent. of blooms have expanded. If the season be favorable for fungoid diseases, a later application at 1 in 40 is advised.

Brown Rot attacking Peaches.—Lime sulphur about the end of July at a strength of 1 in 9 is recommended, with a second application at 1 in 25 when the trees are at the pink stage. If the season appears favorable to the further development of Brown Rot, a third spray at 1 in 100 should be given about a month before harvesting the fruit. Late sprayings with lime sulphur are best applied on cool dry days.

If lime-sulphur be used for leaf curl of peach at the early pinking stage, it can be made a dual purpose spray by the addition of nicotine sulphate at the rate of one pint to every 80 gallons of the lime-sulphur spray, the nicotine sulphate being useful against early aphis. For a similar reason nicotine sulphate may also be added at the same rate to Bordeaux mixture (12—8—80 formula).

Black Spot of apples can be controlled by the Standard Bordeaux (12—8—80) applied when about 10 per cent. of the blooms have expanded, or else by spraying with lime-sulphur at 1 in 15 when about 70 per cent. of blossoms are fully out.

Aphelinus Mali and Woolly Aphis.

Another important orchard practice is to spread as much as possible the small American wasp (*Aphelinus mali*)—recently introduced from New Zealand into Australia. At pruning time, any pieces of aphis-infected wood noticed to be parasitized, and not required on the tree, should be cut off and carried to other parts of the orchard and stuck in the ground under the trees showing the most aphis on their branches. In this way the parasites can be distributed quickly over an entire orchard in a single season. Trees on which these parasites are working should not be sprayed with oil or lime-sulphur sprays.

Frequent inquiries are received from orchardists who ask whether in the event of aphelinus eradicating woolly aphis, it is likely to become a pest, as have so many other introductions to Australia. I am satisfied there is no risk in this direction. In the first place, the parasite will not eradicate woolly aphis completely, since all parasites have their limitations. The work of a parasite is to check the undue increase of a certain species, and in doing this it checks the multiplication of its own species. Its job is to maintain the balance of nature, and this the aphelinus is now doing.

The second reason why aphelinus cannot become a pest is that, even supposing it were to change its host to insects other than the woolly aphis, such insects would have to be of an allied nature, such as other species of aphis or their first cousins, the scale insects, so that, even if this desirable change does ever take place, it will only further extend the usefulness of the aphelinus, and make it of still greater value to horticulturists in general.

No one recognizes more than the writer the very great danger of introducing to Australia, defoliating, boring, or suctorial insects, or, in fact, any insect that feeds on vegetation. It requires very little imagination to realize what havoc a vegetable-feeding insect could cause in Australia, if it happened to extend its range of host plants, as it might very easily do. We already have many instances of our native insects changing from their natural food plants to attack species of introduced plants. In the case of the aphelinus this danger does not exist.

The Codling Moth.

As showing how little is yet known for certain as to the life history of the codling moth, a little experiment carried out by the writer is of interest at the present time.

On 30th December last year a bandage containing codling larvae was removed from a tree and placed in a glass jar for observation purposes. During January seven codling moths emerged, and by the end of February five more moths had escaped from their pupa cases. Early last March six more moths had emerged, making a total of eighteen from the one bandage.

Any person capturing these moths in the orchard might easily believe that they had matured from caterpillars developing at different times of the year, and were not of the same brood. He, in all probability, would not expect to find that all these moths came from caterpillars that had left the fruit when fully fed during last December, and then entered the bandage in which I found them.

But a still more interesting fact is that there still remain in the jar some of the caterpillars not yet pupated. These have spun cocoons on the glass, between it and the bandage, so are easily observed. As these larvae appear plump and vigorous (not having yet pupated) they probably will emerge as moths this spring.* Should these moths have been captured in the orchard they would have been regarded as first-brood moths from caterpillars that developed last autumn, and it would be hard to convince most people that they came from caterpillars that had developed during the spring of 1926.

This delayed metamorphosis of insects, although well known to entomologists, certainly makes it more difficult to know exactly how many generations of codling moths there are in any one year. It also makes spraying for codling a more difficult problem than it is generally thought to be, owing to the intermittent nature of the times of emergence of the perfect insects. In this case a succession of moths from the one bandage was spread over three months, and yet some of the caterpillars still remain unpupated; these probably will emerge as moths this season.

For assisting in the control of codling, clean culture is of first importance. This, together with keeping the fruit well sprayed with arsenate of lead, will keep the pest within bounds to a degree otherwise unobtainable.

The Orchard Supervision Branch last season carried out some tests with lures for trapping the moths. The lures consisted mostly of cider and water, or just apple juice and water. Numbers were captured by these means, but, unfortunately, it was not determined whether the moths were caught previous to having laid their eggs or afterwards.

The chief objection to the use of lures is in the numbers of useful insects that are caught and drowned. Bandaging the trees, if carefully carried out, will give big catches of codling caterpillars, but if not carefully done, more harm than good may result, and it should not be overlooked that caterpillars taken in bandages have eaten all the fruit they required before entering the bandages. Therefore it is a much sounder orchard practice to kill the caterpillars by means of the spray pump before they can eat their way into the fruit, than to trap them after they have eaten their way out.

The most effectual spray against codling is arsenate of lead, used at the rate of 5 lb. to 80 gallons of water. If the powdered form is used, then 2½ lb. is sufficient for 80 gallons of water. The first spray should be applied about a week after the petals have fallen, and thereafter at intervals of three weeks, the last spray being made about three weeks before harvesting the fruit.

Although little is known of the life history of the codling moth, as to the number of broods, or the times of emergence due to delayed metamorphosis already alluded to, we do know that the moths lay their eggs on both fruit and leaves, at intervals of time, and that the caterpillars, on hatching, feed for some time on the thread-like processes on the calyx of newly-formed apples. The first hatchings usually enter the fruit at this point, probably on account of the shelter afforded by the sepals forming the calyx. The later broods enter the fruit at any part, but usually where cover is given them, by fruits touching each other, or by leaves, &c.

* Since this article was written two moths have emerged. They were observed on the 25th October.

GRAFTING OF DECIDUOUS FRUIT TREES.

By J. M. Ward, Superintendent of Horticulture.

In practically every fruit district in Australia, certain trees have been planted, which, at a later date, have been found to be unsuitable for the district, or the variety has been one for which there is little or no demand. This is much in evidence with certain varieties of peaches planted for canning purposes in the irrigated areas of Victoria and New South Wales.

Then, again, in the early plantings of apple orchards in Tasmania, the then best known English varieties were planted for the British markets; but, at the present time, owing to the possession of greater

Fig. 1.—A Whip Graft.

knowledge of the subject, better keeping and shipping kinds are needed to replace such varieties as Ribston Pippin, Mobb's Codling, Emperor Alexander, and others. The same thing applies to, perhaps, a lesser extent with pears and other fruits. There is also the question of working certain varieties amongst other kinds for pollination purposes.

To grub old but healthy and productive trees, and to replace them with young ones, is an economic waste, as well as unnecessary hard work and loss of time. Such trees as those in question can be easily and quickly changed over to more profitable kinds by means of grafting or budding.

As to which are the best of the different kinds of fruit trees to grow has been, and always will be, a difficult problem to solve.

Fig. 2.

(*a*) The scion ready to be prepared for the strap graft. (*b*) The same scion after preparing, showing small portion of bark removed from the back part of the "strap." (*c*) Another view of the scion, illustrating where bark has been removed from another part of the scion.

With the peach, one has to consider the best kinds for canning, for drying, and for the fresh fruit markets; with the apple, there is quality, colour, cool storage, shipping value, freedom from disease, and other qualities to be remembered, and similarly apply to the pear, plum, prune, apricot; in fact, with all our fruits. No doubt the peach is about the quickest to respond to the reworking over to another variety; still, if the grafting or budding is successfully accomplished, the newly-worked buds or scions make rapid headway so far as growth is concerned, for the whole of the sap from the well-established root system is concentrated upon developing these new growths.

Fig. 3.

(*a*) The scion of the "strap" graft inserted ready for tying.
(*b*) After tying and awaiting waxing.

This reminds one that with a beheaded tree there is a great flow of sap during the spring and early summer months, and with the decreased upper portion of the tree adventitious buds on all parts of the remaining main arms and trunk are forced into growth, and if allowed to remain for any length of time, such growth is likely to detrimentally affect the newly inserted buds or scions.

At the same time a "safety valve," as we may term it, should be provided to take up some of this flow of sap. This applies particularly to apples. If every limb or branch is removed when preparing the tree for reworking, the remaining portion will in all probability be

Fig. 4.—A "Strap" Graft, Three Years Old.
Note that the strap is gradually growing over the cut surface of the stock.

Fig. 5.—A "Strap" Graft, Five or Six Years Old.
The cut surface of the stock is almost covered by the growth of the strap.

Fig. 6.—A "Strap" Graft, Five or Six Years Old, which has Completely Covered up the Cut.

Fig. 7.—A Twenty-year-old Tree which has been "Top-worked" by the "Strap" Graft Method.

Note the complete absence of cut surfaces, with the result that there is no dead or decayed wood.

detrimentally affected and will probably die two or three years later. This has become very noticeable in many apple districts in all the States, but does not appear to the same extent with other fruit trees. Having this in mind, growers are strongly advised to allow one or two main arms to remain on the tree for one or even two growing seasons before removing them, thereby providing a "safety valve."

Although it has been practised to some extent in the past, it is unwise to cut any fruit tree hard back to the single trunk for reworking

Fig. 8.—Robe de Sergeant Prune "Top-worked" to Apricot Stock with the "Rind" Graft.

Note decayed portion on trunk where grafting had been done

purposes. Certain successes have been achieved in this way, but more failures than successes have resulted from the practice.

Reworking trees by grafting is carried out during September and the early part of October. Some growers also graft during the latter part of August. Budding is done during January, February, and in early March.

The reworking of apricot, almond and peach trees is usually done by budding, as greater success is generally achieved by this method

than by grafting. This, however, cannot be taken as a "rule of thumb," for conditions vary according to locality, weather, and the skill of the operator. Grafting of peach trees is often as successful as budding in the Stanthorpe (Southern Queensland) district.

In preparing a tree for reworking it can be cut down either some weeks before the work is to be carried out, or on the same day.

It was generally understood at one time that, to be successful, the tree should be cut down a month or more prior to grafting. However, the writer, as well as many others, has been very successful in reworking by cutting the tree or trees down the same day as that on which the grafting takes place.

There are a number of methods of grafting, the most commonly known are the "whip" or "tongue," the "saddle," the "rind" or "bark," and the "strap" graft.

Fig. 9.—A Close-up View of the same Tree as shown in Fig. 8.

Whip Graft.

This method is used when scion and stock are of somewhat similar dimensions. It is both simple and effective. Three to five main limbs are selected, and a graft or scion placed into them as follows:—

Each limb is cut so that a long—1 inch to 1½ inches—smooth, slanting surface is obtained. This operation should be carried out by making one clean cut with a sharp knife.

The scion is similarly treated, and a small "tongue" made in the surface of both stock and scion.

A union is then made by bringing the cut surfaces together so that the two tongues fit into each other. Care must be taken to see that the cambium layer—inner bark—of both parts come in contact with each other. The grafted portions are then tied tightly with raffia or other suitable material and the whole waxed over.

Saddle Graft.

This was practised to some extent years ago, but as better methods are now in vogue the saddle graft is not recommended.

Rind or Bark Graft.

This method is employed for the reworking of trees having limbs an inch or more in diameter. The tree is cut down to about 5 inches or 6 inches above the " crotch " (where the main limbs branch out from

Fig. 10.—Result of allowing Wood on Prune Trees to Decay. "Strap" Grafting would have Prevented this.

the trunk), selection being made of those parts which are in the best position to receive the scion. This is then prepared in a somewhat similar manner to the scion as described in the " whip " graft, but no " tongue " is made. A small portion of the bark at the opposite side of the cut is, however, removed. By doing this a better " take " is effected. The bark on the stock is then prepared to receive the scion. This can be done in two ways. One is to make a simple cut with the point of the knife, the bark is then gently eased away from the wood, and the scion slipped in. The other way is to make two cuts in the bark about half an inch apart, the bark is pushed away whilst the scion is put in. The latter method is probably the more successful of the two.

Strap Graft.

For trees of similar size to those mentioned in the "rind" or "bark" graft, there is no better known method of grafting than the "strap," so named by the strap which crosses over the cut surface of the limb, even if the limb be 6 inches in diameter. The scion is cut in such a manner that a long strip of bark, together with a little wood attached, is partly removed—this forms the strap. The wood from which the cut has been made is then removed by making a slanting cut about 1½ inches long on the opposite side to that where the "strap" was cut. The length of the "strap" cut should be the diameter of the stock, plus about 1½ inches. The scion is then ready for insertion into the stock, which is prepared in the same manner as explained in the "rind" or "bark" graft, with the addition that the bark is also eased from the opposite side so that a portion of the "strap" is inserted on one side, and to the same scion on the other side.

The whole is then securely tied and waxed. The "strap" taken across the face of the stock, in the course of a year or two, will grow in such a manner that the cut becomes well covered up.

Although the explaining of the "strap" graft takes some little time, the putting of it into practice is a rapid operation.

There are several recipes for making grafting wax, a simple method is by melting together 1 lb. beeswax, 1 lb tallow, ¾ lb. resin; this can be used either hot or cold.

When grafting is carried out, the operator should be careful in selecting his scions from healthy productive trees bearing a good type of fruit. He should also see that the stock has a good healthy rooting system.

LUTHER BURBANK AND HIS WORK.

The Harvest of Years, by Luther Burbank, with Wilbur Hall (from Angus and Robertson, Sydney), is a book compiled by Wilbur Hall from manuscript written by Burbank, and intended as an autobiography. It tells of his early days, as well as of his experiments with plants, and relates many personal incidents extending over his whole lifetime. The keynote of the book seems to be Burbank's cheery optimism. His work was congenial and made him a very happy man, and his happiness oozed out to cheer all with whom he came in contact. Chapter four is interesting to the student of genetics, for it deals largely with the principles of plant production as pursued by Burbank, and incidentally shows that his methods more clearly followed the lines of De Vries in plant mutation and selection rather than those of Mendel in definite breeding work. He says, "It was in this instinct for selection that I was gifted. It was born in me, and I educated it and gave it experience, and have always kept myself attuned to it." Thus Burbank cannot be truly called, as he often is, a great plant breeder.

The book is full of interesting experiences, and we are introduced to many famous people who visited him. The illustrations deal more with incidents in Burbank's life than with his experimental work. Still, as an autobiography of a man who spent his life among plants and flowers, and whose reputation was world-wide, it is a very interesting and human record.

The price of the book is fifteen shillings.

HARVESTING OF BERRY FRUITS.

By J. M. Ward, Superintendent of Horticulture.

The picking and marketing of berry fruits are not such simple matters as may appear. Practically each variety of these fruits requires somewhat different handling so far as picking is concerned; therefore, I shall attempt to furnish information on each kind.

Strawberries.

This fruit should always be picked early in the day, but should never be taken from a plant that is wet with dew or rain. The fruit should be pinched and not pulled from the plant. If the calyx and a short length of the stem remain on the berry, it will keep considerably longer in the fresh state. Where berries are handled in fairly large quantities, they must be picked a little on the under-ripe side, so that they will arrive at inland towns in prime condition. They should be well coloured, however. Over-ripe berries, or even those just ripe, will not carry very far and remain in firm condition, and nothing will turn a consumer away from purchasing strawberries so much as bruised and unattractive fruit.

For use close to the locality where grown, the berries can be allowed to remain on the plant for a day or two longer than would be the case if they were required for a more distant market. If left on the plant for this extra period, the fruit will be of better flavour and more highly coloured, and of greater size.

The bed should be picked over regularly at least once in every two days. Daily picking is preferred, for then a much more uniform product is secured, and over-ripe berries eliminated. Growers should be careful in the grading or sizing of the fruit. Every endeavour should be made to have berries of fairly even size in each basket or punnet. Should the grower prefer to have mixed sizes in the one container, he should be honest, and not put the small ones in the bottom and the large on top. Such practices are unfortunately adopted by a few growers who, in doing this, are inviting trouble for themselves, as the law does not tolerate "topping" of any fruit. He is therefore liable to be prosecuted under the Regulations of the Fruit Act. Not only that, the practice is a dishonest one, and results in the consumer going without strawberries rather than submitting to robbery, as he rightly terms it.

Perhaps at this stage it may be advisable for me to remind growers and others of that portion of the Regulations governing the selling of fruit, which reads as follows:—

> Fruit or vegetables contained in any package of any description or size, or comprised in any lot shall be so packed, stacked, or arranged that each external layer on the top, bottom, and sides of the fruit or vegetables shall be uniform in respect to grade, and shall be a true indication of—
>
> (*a*) The average grade, throughout, of the whole of the fruit or vegetables contained in such package or comprised in such lot.

This regulation is being strictly enforced, and it is no pleasure to departmental officers to have to prosecute sellers of fruit for the purpose of enforcing them to place an honest pack before consumers.

It is much better for all concerned to have the fruit put up in an attractive manner, and thus invite the public to consume a greater quantity.

Properly graded and packed fruit pays well for the extra time and labour involved in the operation. A good slogan in this respect is:

Proper Packing Pays.

Proper packing cannot be carried out if the fruit varies to any extent in size.

All strawberries for home consumption, particularly if they are despatched over a railway journey, should be put up in 1 or 2 lb. baskets or punnets, then carefully packed in boxes or crates that hold some two dozen punnets. This, of course, is a common practice with most growers, but altogether too many strawberries are marketed in buckets.

Raspberries and Loganberries.

These fruits are handled in a somewhat similar manner to strawberries, but, in this instance, the fruit is separated from the stalk when picking.

Raspberries are ready to pick as soon as they separate readily from the receptacle or stalk. At that time they are not so easily bruised on picking and handling, and thus are not so subject to the attacks of fungi as when allowed to become fully ripe. These remarks, of course, apply principally to the fruit that is harvested for the fresh fruit market.

Both raspberries and loganberries should be picked into trays containing from four to eight punnets. These, when full, should be placed in a cool and shady place. Like strawberries, these fruits should be gathered during the early part of the day when the berries are cool. Not only are warm berries harder to cool, but the thin membranous covering is weaker and more easily broken in picking and handling, and thus will not carry well.

For jam-making purposes in the factories, the fruit should be delivered in such utensils as wooden or cardboard buckets. For the fresh fruit market, however, they should be handled in the same manner as was advised in the case of strawberries.

Gooseberries.

This fruit is usually harvested while green, to be used for canning and making of preserves. Market prices are generally too low to justify the making of more than one picking, consequently the usual method is to pick the bushes clean when most of the berries have reached full size.

Currants.

Black and red currants for household use can be successfully marketed in half-cases. They should be gathered with the stalks on the fruit. A great mistake is often made by nailing the cases up when the fruit is warm. When this is done, the fruit will not keep—a state of affairs as unsatisfactory to the grower as to the consumer. The fruit should always be allowed to cool off before nailing up, and be kept in a cool place until it is placed on the railway trucks, or delivered to the consumer if carried in a motor truck. If picked for the jam factories, the fruit should be free from stalks, otherwise the grower will be charged for stalking.

COOL STORAGE OF BERRY FRUITS.

By G. B. Tindale, B. Agr. Sc.

Berry fruits are the most perishable of our fruits, and it is indeed on this account that they are not more extensively grown. Owing to their very limited life, and to their extreme susceptibility to mould attack, cool storage of them in the fresh state is quite futile. With the addition of sugar, however, they may be held for many months, and in the United States of America large quantities are so treated, and are disposed of throughout the year.

Experiments conducted at the Government Cool Stores last season demonstrated the value of such a process for storing raspberries, strawberries, loganberries, and black currants for periods of many months.

The containers used were enamel buckets, although wooden casks or barrels would be equally suitable. The procedure adopted was to place a layer of berries in the bottom of the container; this was then covered by a layer of sugar, and the process repeated until the container was filled.

The object was to mix the berries and sugar intimately, and equal weights of berries and sugar were used, although probably the amount of sugar used could have been slightly reduced, especially in the case of the strawberries.

The berries were stored at 25° F., a temperature at which the mixtures do not freeze. The possibility of mould attack is very remote, not only on account of the low temperature, but also owing to the presence of the sugar, the mixtures being too concentrated for mould growth to occur; thus the sugar acts as a preservative.

The raspberries, loganberries, and strawberries were treated in December, and the black currants in February. They are still in a perfectly sound and fresh condition, and on removal from store they keep in a wholesome condition for many weeks.

The mixtures are now like pulp, and are most suitable for kitchen use, while if the juice is extracted and added to iced soda water, it makes a wholesome pure fruit-juice drink.

The strawberries did not keep quite so well as the other berries, but this may be accounted for by the fact that they had somewhat deteriorated prior to being placed in storage.

The cost of storage is low, for berry fruits take up little space when compared with equal weights of other fruits. The first cost of the containers would be rather heavy, but these could be used from season to season.

If such a method of storage were adopted here, it should be possible for the berry-growers to arrange for a continuous supply of fresh berries to restaurants, soda fountains, &c. There is little doubt that there would be a demand for them, particularly as they would be ready for immediate use without further preparation.

FERTILIZERS FOR POTATOES.

RESULTS OF EXPERIMENTS.

By J. T. Ramsay, Potato Expert.

Results of the potato experimental plots at Childers, Romsey, Warragul, Catani, and Trentham were published in the September issue of the Journal.

WHEATSHEAF.

Last year for the first time manurial trials on potatoes were conducted at Wheatsheaf. The manurial variations given were those adopted in all other potato tests during the last four seasons. The land is a rich red volcanic soil. The season was much below average in rainfall, and, consequently, tonnages were light as compared with what is usually grown in that district.

The total rainfall from 17th December to 26th April, which corresponds to the growing period of the crop, totalled only 300 points, and fell in such light showers—the heaviest being 86 points in December, and the next heaviest only 35 points in January—that none of these was sufficient to give the ground a thorough soaking. High temperatures and drying winds contributed in diminishing the effect of these light falls of rain.

In the accompanying table the weights recorded are shown, together with details as to increases from manure, manure costs, cost per ton increase, net increased value per acre, and percentage increases. The heaviest increase was obtained from dressing No. 7, which was 6 cwt. super., 1 cwt. ammonium sulphate, and 1 cwt. of sulphate of potash per acre, and which gave 1 ton 16 cwt. 1 qr. per acre over the unmanured plot. This result is unusual, inasmuch as potash seems to have played some part in increasing the crop on the Wheatsheaf country. In the great majority of results obtained from other centres, potash has not contributed to an increased yield, but rather has had the effect of decreasing the yield. However, as only one year's trial has been conducted at Wheatsheaf, these figures cannot be taken as final, and further experimental work should be awaited before any definite conclusions are arrived at.

In calculating the value of the crop, £5 per ton has ben taken, which now is below the average of the season's prices; but has been retained on account of that value per ton being utilized in making comparisons of trials conducted in other centres this year.

Probably the safest column in the accompanying table of which to take cognizance is that showing the percentage increases due to the various manures, which range from 25 per cent. to 87 per cent., and it should be noted that the increase is constant in the case of all manures, and the whole of the variations of the manuring show a profit. It should be borne in mind also that the full benefit from manures is not obtained in a dry year, and that some residual effect of the unused portions of these will be manifest in the season to come.

In the cultivation test, the dry season again acted adversely, and yet, in spite of this, there was a fair percentage increase in favour of the greatest number of cultivations. This bears out the results of the

experiment on the number of cultivations which was conducted at Millbrook during last season, and points to the strong advisability of more inter-cultivation being given to the potato crop than is customary amongst growers at the present time.

As was expected, the whole seed gave a better performance than the cut seed. Cut seed was used against whole seed with two different dressings, viz.: 3 cwt. and 6 cwt. of superphosphate. Where 3 cwt. of super. was applied the whole seed gave an increase of 1 ton 15 cwt. 2 qrs., which, at £5 a ton, equalled an extra £7 17s. 6d. per acre; and in the case of the 6 cwt. per acre dressing there was an increase of 14½ cwt., worth £3 2s. 6d. more per acre.

Further results from this field will be interesting, and it is to be hoped that better seasonal conditions will obtain next year when these tests will be repeated.

Results of Manurial Experiments at Wheatsheaf.

Conducted on the Farm of Mr. James Gooch.

Soil—Red Volcanic Loam.

Plot No.	Manure per Acre.	Yield per Acre.	Increase due to Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Nett Increased Value per Annum.	Percentage Increase.
		T. C. Q.	T. C. Q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	%
1	Super. 3 cwt.	2 11 3	0 10 2	0 18 9	1 14 0	2 12 6	1 13 9	25
2	,, 6 cwt.	3 0 2	0 19 1	1 17 6	1 16 0	4 16 3	2 18 9	49
3	,, 9 cwt.	3 10 0	1 8 3	2 16 3	1 18 8	7 3 9	4 7 6	70
4	,, 6 cwt., pot. sulp. 1 cwt. ..	3 7 1	1 6 0	2 13 0	2 10 0	6 10 0	3 17 0	63
5	No manure	2 1 1	..	..	..	..	..	..
6	Super. 6 cwt., ammon. sulp. 1 cwt. ..	3 7 1	1 6 0	2 15 0	2 2 4	6 10 0	3 15 0	63
7	Super. 6 cwt., ammon. sulp. 1 cwt., pot. sulp. 1 cwt.	3 17 2	1 16 1	3 10 6	1 19 1	9 1 3	5 10 9	87
8	Market garden manure 3 cwt.	3 4 3	1 3 2	1 8 6	1 4 4	5 17 6	4 9 0	56
9	Basic phosphate 3 cwt.	2 14 1	0 13 0	0 18 9	1 9 0	3 5 0	2 6 3	31

Average of five farmer's lots outside the official plots—2 tons 15 cwt. 2 qrs.

Cultivation Test—

	T. C. Q.
Cultivated once	2 6 2
Cultivated twice	3 6 0
Cultivated thrice	3 11 0

Cut seed versus whole seed—

	T. C. Q.
Cut—3 cwt. super.	2 11 3
Whole—3 cwt. super	3 17 2
Cut—6 cwt. super	3 0 2
Whole—6 cwt. super.	3 15 0

MUSK.

The figures obtained from the experiments at Musk are light as compared with those from other parts of the State, owing to an exceptionally dry season for this particular district. Nevertheless, there are appreciable percentage increases shown from all the manures. The dressings which come out best are No. 4 (super. 6 cwt., potassium sulphate 1 cwt. per acre), with a 65 per cent. increase, and No. 6 (super. 6 cwt., ammonia sulphate 1 cwt.), with 63 per cent. increase.

It is illuminating to find that even in a dry year this class of soil has responded to manurial treatment, because it has not been the practice of farmers in the district to apply any fertilizer.

The cultivation test, while not showing a very heavy increase due to additional cultivations, still illustrates the fact that the crop benefits even in a dry year from additional inter-cultivation. The same remark applies to cut as against whole seed—the whole seed showing a slight increase of 7 cwt. per acre.

It is to be hoped that the seasonal conditions during next year are more favorable to the growth of potato crops in this district, so that substantiation of these results may be permitted.

Results of Manurial Experiments at Musk.

Conducted on the Farm of Mr. E. Bull.

Soil—Light Volcanic Loam.

Plot No.	Manure per Acre.	Yield per Acre.	Increase due to Manure.	Cost of Manure.	Cost per Ton Increase.	Increased Value per Acre.	Nett Increased Value per Annum.	Percentage Increase.
		T. C. Q.	T. C. Q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	%
1	Super. 3 cwt.	3 5 2	0 16 0	0 18 9	1 3 5	4 0 0	3 1 3	33
2	,, 6 cwt.	3 11 0	1 1 2	1 17 6	1 14 1	5 7 6	3 10 0	42
3	,, 9 cwt.	3 11 0	1 1 2	2 16 3	2 13 6	5 7 6	2 11 3	42
4	,, 6 cwt., pot. sulp. 1 cwt. ..	4 1 2	1 12 0	2 13 0	1 13 1	8 0 0	5 7 0	65
5	No manure	2 9 2	..	..	..	..	..	..
6	Super. 6 cwt., ammon. sulp. 1 cwt. ..	4 0 1	1 10 3	2 15 0	1 19 1	7 13 9	4 18 9	63
7	Super. 6 cwt., ammon. sulp. 1 cwt., pot. sulp. 1 cwt.	3 17 2	1 8 0	3 10 6	2 10 4	7 0 0	3 9 6	57
8	Market garden manure 3 cwt.	3 7 0	0 17 2	1 8 6	1 12 0	4 7 6	2 19 0	34
9	Basic phosphate, 3 cwt.	3 3 0	0 13 2	0 18 9	1 8 0	3 7 6	2 8 9	26

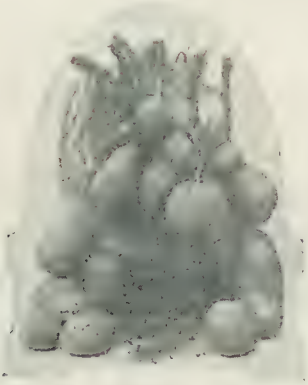
Average of five lots from the farmer's acreage adjoining experimental plot, with 4 cwt. super. per acre—4 tons.

Cultivation test—

	T.	C.	Q.
Cultivated once	3	0	1
Cultivated twice	3	5	2
Cultivated thrice	3	12	1

Cut seed versus whole seed—

	T.	C.	Q.
Cut seed, 3 cwt. super. per acre ..	3	5	0
Whole seed, 3 cwt. super. per acre ..	3	12	0



MOULTING OF POULTRY.

By W. C. Rugg, Chief Poultry Expert.

Moulting of birds is the process of casting off and renewing feathers, hair, and horn, and though a natural one, makes a very heavy tax on the system. There is little one can do to prevent it: the laws of nature will run their course.

When a hen starts to moult, she usually stops active egg production, because of the severe strain upon her entire system. The time occupied in moulting varies in the individual birds, but it can be increased or diminished by a little care. Those fowls come through the moult best which are just a little thin or spare in condition at the commencement, so that they may bear a little extra feeding and slight gradual increase in weight during the process of growing their new coat of feathers. This extra feeding should not, however, be begun until the new feathers have actually started. Whilst casting feathers only, fowls usually have very little appetite and should not be forced at all. If they are too poor in condition it is bad, though to be over-fat is worse.

Whenever possible, a natural moult should be encouraged—that is to say, the birds should be allowed to cast their old feathers and grow the new crop without resort to condiments. Healthy stock will usually complete the moult in six or seven weeks, but certain birds take twice that length of time. The poor layer usually starts casting her feathers in early summer, and often twelve to sixteen weeks will elapse before she comes back into lay again. The general rule is that the early moulter is a poor layer and, at least, should be looked upon with suspicion. It is a common practice on some farms to select late moulters for the following season's breeding operations. But a word of warning is necessary to the inexperienced.

Much depends on the time chickens are hatched as to when they will moult. Hatched at the right time of the year, which is July, August, and September, they should, if properly treated, come into lay during January and February. If they lay on for twelve months or over and moult in March or April of the following year, they are classed as late moulters. But when chickens are hatched late, that is at the end of October and November, they take longer to develop, and often do not lay until July or August; consequently, they are likely to be amongst the latest in moulting. These late-hatched birds should not be confused with those that probably were laying four or five months before the late-hatched ones started.

Late-hatched birds usually take a long time coming through the moult, owing to the fact that they are never constitutionally as strong as the birds hatched at the right time of the year. They usually come into lay very late the following season, and if used as breeders, the hatching season is prolonged, the chickens arrive late, when the spring is over, and much of the natural food in the way of insects and the tender shoots of green stuff have disappeared owing to the warm weather. On the other hand, pullets hatched too early often lay when too young, lay well for a little while, and then go into moult in the late autumn, which means they will be out of production when

eggs are scarce and dear during May and June. Very often the future moults of these birds are upset for life, though, of course, there are exceptions.

Much harm can be done by careless methods of feeding at this time of the year—just at the time when many birds are on the point of ceasing to lay.

The Feeding of Moulting Birds.

During the month of February is a good time to separate hens into two flocks. Birds that it is intended to keep for another year should be taken out and put into another shed. Those which are to be sold should have a plentiful supply of good food, and a little extra meat or milk in the mash, and chaffed green food should be given after the grain feed at night. This will encourage egg production, ward off the moult, and help to get them into better condition for the table. The risk of over-fatness need not be considered, because the extra weight will help to secure a good price for the birds when the time arrives to dispose of them, which should be as soon as they start to drop their feathers. If they be held too long, or until they are in full moult, they will not bring such a good price. Moving these birds into fresh houses should be avoided, as this frequently checks egg production and brings on the moult.

All the birds to be kept for another year should be specially fed; their systems should be kept cool by plenty of green stuff, and then any food eaten will be better assimilated.

Whilst the birds are dropping feathers, and before the new ones start to grow, the food should be of the plainest description; in fact, nothing should be given that is likely to stimulate egg production. Therefore, no meat or milk should be fed in the mash. Best results have been obtained at the Research Farm, Werribee, when only small quantities of mash are fed, and that of plain bran and pollard, mixed with water (with sometimes a little oat pollard added for variety), and chaffed green stuff. Usually the quantities are by measure—1 part bran, ½ part pollard, and ½ part chaffed green stuff. The bran is saturated with water, dried off to a crumbly condition with the pollard, and then the green stuff is mixed thoroughly through it. Twice a week sulphur at the rate of a small tablespoonful to each dozen birds is added to the bran before it is wetted; 1½ to 2 ozs. of mash per bird is sufficient. Green stuff is fed at mid-day and Algerian oats at night—as much as they will eat. For green stuff at this time I like chou mollier, rape, mustard, cabbage, or silver beet, if available; if not, young lucerne. The oats should be good plump clean grain; a little wheat or good English barley can be given for variety.

A watchful eye should be kept on the birds, and as soon as the new feathers first appear the ordinary mash can be restored and 5 per cent. meat or milk added. (The allowance of meat and milk may be gradually increased to 10 per cent.). A little linseed is a great help at this time; it should be gently stewed to a jelly before being added to the mash—a good half-teaspoonful per bird should be allowed. Sunflower seeds are also good on account of their oil content, but many birds do not like them. The greater variety of food supplied at this time the better. It will not only help the birds to grow their new coat of feathers rapidly, but will assist them store up fat on which they will draw throughout the coming egg-producing period. A quick and good moult is the chief thing to aim at.

Vermin—A Cause of Trouble at all Times, Particularly at Moulting Time.

If birds cast all their old feathers and grow new ones rapidly, that is what pleases the poultryman best. Sometimes birds will hang in the moult and have difficulty in growing their new plumage. A very common cause of this is vermin, which we now realize takes a larger and larger place as the real cause of many poultry ailments, and possibly is the means of distributing disease over great numbers of birds. Every care should be taken that birds are free from vermin before moulting, and during the process.

At this time the skin is naturally in an irritable and feverish condition, and any additional irritation is more acutely felt then than at any other time. Further, the young feathers are liable to be attacked, and thus prevented from growing out properly. During the moulting season, particularly, attention should be paid to providing a proper dust bath. On many farms no dust baths are provided, the owners relying on sprays of disinfectant and insect powders to keep the birds clean. This is much to be regretted. Of course, birds will, when the litter in the pens is well broken up, find a certain amount of relief in dusting themselves in that, but I am sure it is advisable to have a proper dusting place at moulting time, if at no other.

There is no doubt that the working of dust and sand through the feathers into the skin helps to remove the white flaky scales or scurf which forms on the skin during moult, and also helps to destroy parasites. Another reason is that the fowls also moult the scales on their shanks, and the friction caused by scuffling in the dust and sand helps to clean off the old scales. If these scales are not got rid of, they form a lodgment for a minute insect, called the scaly leg mite, which not only causes irritation to the bird, but when these mites increase, which they do very rapidly, encrustations are formed, giving the shanks of the birds a very unsightly appearance. If a bird affected in this way be neglected, it may be that ere long the whole flock will contract the trouble.

A good dusting place can be made out of a case approximately 3 feet square, 15 inches deep. Into this put four kerosene tins of sand or street dust, two tins of ashes, and half a dozen handfuls of sulphur. If this is sprinkled with water from a watering can occasionally it will be much appreciated by the birds.

When Moulting is Delayed.

When moulting is unaccountably delayed, or does not continue after beginning, a change of quarters is generally a remedy. If the birds are running out, they may be brought into a warmer shed and kept confined. If, however, they have been kept in warm sheds, open runs would be the place for them. Judgment must be used, and on no account should birds be exposed to a temperature too severe, because at this time, owing to the fact there has been a considerable drain on their bodies through a long period of egg production, their systems are less resistant to colds, which just now so often develop into catarrh, chicken pox, and sometimes roup.

I have also discovered when the moult is delayed, that it may be advisable to drop the mash altogether and place a hopper of plain dry bran in the pen, leaving it always available to the birds, as well

as feeding plenty of green stuff, with only Algerian oats for the grain food. This treatment nearly always has the desired effect.

As soon as the birds are well broken in feather, I consider no time should be lost in restoring the usual food in good variety. Dried milk is particularly valuable then. It is also essential to supply plenty of good quality grit and granulated charcoal, as well as clean cool drinking water.

In conclusion, I would remind you that a great deal of the success of your next breeding season depends on the care of the breeding stock during their moulting period.

All the birds from which it is intended to breed next season should be selected during March, at the latest, and treated as I have described. It is hard, of course, to ease up birds that are laying in March, when eggs are rising in price, but you cannot have the cake and eat it too. If early chickens from the best stock are desired, those few eggs in March and April must be sacrificed, and the breeding stock given the necessary rest, so that, when mated in July, strong virile chickens will be produced in the early spring.

LINDENOW MAIZE TESTS.

The Maize Variety Tests conducted at Lindenow by the Department of Agriculture were continued during the season 1926-27, when twenty different local strains of maize were tested against each other on the farm of Mr. T. W. Murphy.

This season will long be remembered as one of the most abnormal ever experienced at Lindenow. A period of cold windy weather followed the sowing of the crops, with the result that the young plants made slow and spindley growth. In the middle of December, just as the crops were making good growth, several severe frosts were experienced. Many crops were cut to the ground, and for a time it appeared most unlikely that they would recover. Indeed some crops had to be replanted. An opportune shower revived most of those which had been struck, but this was followed by a prolonged dry spell which extended through the tasselling and cobbing stages of the crops. Those which had been replanted were affected by early frosts experienced in April.

Naturally this combination of unfavorable climatic conditions had a serious effect on the yield of the district, which was one of the lowest on record.

The experimental plot suffered in common with the other district crops. Indeed it was one of the crops most severely affected by the December frost. The young plants were cut to the ground, and for some days all that was visible was a blackened mass. Under the circumstances, high yields could not be expected, and the leading varieties did not yield more than 42 bushels per acre.

The Bairnsdale Agricultural Society takes advantage of the maize variety test to promote a competition amongst the growers. The object of this competition is to induce farmers to pay greater attention to the selection of their seed. Points are awarded for actual yield, uniformity, character of plant and ear, and freedom from disease. This

competition was judged by Mr. P. Ryan, B. Ag.Sc., Inspector of Agriculture, whose awards are as follow:—

Points Allotted Each Competitor in the Lindenow Maize Competition.

—	Uniformity of Plant.	Character of Plant.	Character of Ear.	Yield.	Freedom from Disease.	Total.
Telfer Brothers (own selection)	4	8	6	75	2	95
J. Murphy	4	8	6	75	2	95
J. R. Keating	4	7	6	72	2	91
G. Ray	4	7	5	70	2	88
C. Fountain	4	7	5	69	2	87
F. M. Murphy	4	7	5	69	2	87
F. W. Smith (flat red)	4	7	5	67	2	85
Ross Brothers	4	7	5	65	2	83
F. W. Murphy	4	7	5	65	2	83
H. J. Hauschildt	4	7	5	65	2	83
H. Evans	4	8	6	62	2	82
Telfer Brothers (golden superb)	4	8	6	61	2	81
F. W. Smith (Brewer's yellow dent) ..	4	7	6	61	2	80
E. Marbin	4	8	6	60	2	80
W. Poynton	4	9	6	59	2	78
H. James (Funk's yellow dent) ..	5	9	6	56	2	78
H. James (golden glow)	4	8	5	55	2	75
J. Alexander	4	8	5	56	2	75
L. Fell	4	8	5	55	2	75

It will be seen that Messrs. Telfer Bros.' selection and Mr. J. Murphy's selection are again equal for first place, while third place is taken by Mr. J. R. Keating's selection.

The outstanding feature of the results is the consistent performance of the two leading strains ever since the inception of the test. This is shown in the following table:—

Telfer Bros.' Selection:	J. Murphy's Selection:
1923-24.—Second.	1923-24.—Seventh.
1924-25.—First.	1924-25.—Second.
1925-26.—Equal first.	1925-26.—Equal first.
1926-27.—Equal first.	1926-27.—Equal first.

The results show fairly conclusively that these two strains are superior to those generally grown in the Lindenow district, and it is highly probable that the average yield of the district could be appreciably increased by the general use of either of them.

It may be opportune to remind Lindenow maize-growers that the reason for instituting these tests was to discover the highest yielding local strains so that growers would be in a position to improve their

yields by using seed from those strains instead of those found to be less prolific. The tests will have little value if growers continue to use strains which have given consistently moderate yields.

Recently many complaints have been heard concerning the difficulty of keeping maize true to type. In a district like Lindenow, where the crops are grown in very close proximity to one another, this trouble is likely to remain until some uniformity is reached in regard to the choice of a variety. Until these tests were instituted, growers had no reliable data as to the relative merits of the various strains grown in the district, but now that the information is available they should not hesitate to take advantage of it.

In previous reports on this competition emphasis was laid on the desirability of selecting seed maize in the field, but, unfortunately, very few growers have yet adopted the practice. There is no doubt that the yield of the district would be appreciably increased if the present policy of selecting seed maize from the crib were replaced by systematic selection in the field.

When seed is taken from the crib there is no way of telling whether the largest and heaviest ears did not come from plants which had special advantages in the field, such as of extra space, moisture, &c.

In selecting in the field, ears produced under such favorable conditions would be discarded, and only ears from plants which are prolific under normal or adverse conditions would be retained. There is no doubt that the present system of selecting seed maize from the crib has been responsible for the Lindenow maize becoming later in maturing. The largest and heaviest ears are invariably the ones selected, and it is generally these that have taken the longest to mature. The cumulative effect of this method of selection over a number of years has led to a lengthening of the growing period, and many strains are now too late in maturing to permit of maximum yields under normal conditions.

Many of the maize lands in the Lindenow district are showing signs of humus exhaustion. They are becoming more difficult to plough, turn up in clods, crust readily on top, and in general are proving difficult to get into good tilth. Many growers expect that the application of artificial manures will remedy this. It is well to understand that the application of fertilizers does not increase the amount of humus in the soils, and that the full beneficial effect of fertilizers cannot be obtained in soils depleted of organic matter. The remedy will lie rather in the adoption of a well-planned rotation system, combined with the keeping of live-stock. Lucerne and red clover are worthy of consideration as rotation crops. Both do well on these flats, and individual farmers who have grown them have been surprised at the invigorating effect on the succeeding maize crop. Both crops are legumes, and, therefore, are able to use the nitrogen of the air and store it in the soil in the form of nitrates. Lucerne, of course, will occupy the ground for several years, but cow grass is suitable for a shorter rotation. Another practice that should be worthy of consideration is the sowing down of a mixed pasture of grasses and clovers either for dairying or for the topping off of sheep and lambs.

While the application of different manures did not lead to significant improvements in yield, it is interesting to note that the same plots gave the largest increases this year as last, namely, those which received a

combination of superphosphate and ammonium sulphate. However, as the results from these plots have shown a lack of consistency, it has been decided to change their layout so as to provide for replications of the various manureal treatments with a view to obtaining more accurate results.

PICKING AND PACKING TOMATOES.

By Basil Krone, Fruit Packing Instructor.

Harvesting.

To judge the time when tomatoes are in the most suitable condition for harvesting is very simple. They should always show at least some colour—a definite tinge of pink at the flower end of the fruit. They should never be picked when totally green. The quantities of green tomatoes that arrive on the market are responsible to some extent for comparatively poor returns to growers. The fruit agent has no desire to handle them, for they are not desired by the public except, perhaps, a small quantity for pickling purposes.

On arrival at the market green tomatoes have to be kept until sufficient colour develops in them before they will realize a profitable price to the grower—this is a matter of some days, and even then, although they may have coloured, they will probably have an immature appearance, and, coming into competition with the fresh, ripe fruit, they will bring only a poor price.

During the harvesting period, growers will have tomatoes in every degree of ripeness from those just commencing to turn colour to red ripe. But successful marketing is impossible unless they are well graded. To facilitate this, the fruit should be gathered at frequent intervals, in order that the quantity of overripe fruit may be kept at a minimum. This is known in the tomato industry as "close" picking.

Sizing and Grading.

There are several points which should never be overlooked when grading tomatoes. These are equally as important as the packing itself, and are as follows:—

Grade for colour as well as size, that is, pack the ripe tomatoes in separate cases from the semi-ripe, sorting them into three sizes. The small should include all tomatoes under 2 inches in diameter; the next size should include all tomatoes from 2 inches to 3 inches in diameter; and the large size should be 3 inches and over.

These sizes are provided for in the regulations under the Fruit Act. They allow considerable variation in the different grades, but it will be readily understood that if tomatoes of uniform size are selected for each case a more attractive pack will result.

What is referred to as the size of a tomato is the greatest measurement of its diameter from cheek to cheek, not from stem to eye. Tomatoes classified as ripe should be from two-thirds full coloured, and those as medium ripe from one-third full coloured. If grading to colour is carried out accordingly, it will mean that when the tomatoes arrive on the market they will be fairly even in colour and should meet with a ready sale.

A mixture of green and ripe tomatoes packed in the same case invariably opens up at the market with many ripe ones squashed, while the others are only just turning colour. All tomatoes that are fully red in colour and firm are suitable to pack, but if they are at all soft they should be placed in a case for the factory, for they will certainly open up "wet" on the market.

It should be remembered that good packing of any fruit largely depends on accurate sizing. If fruit is not fairly uniform in size no one will make a good pack of it. The beginner, however, can soon acquaint himself with the sizes by the use of rings, or a wooden gauge with holes cut in it. After a little practice the gauge will not be wanted, and the packer at a glance will know the size of any fruit.

To grade and pack properly is to put a standardized product on the market. Standardization simplifies selling, but it must begin at the packing shed or with the packer on the plantation. If a retailer purchases a case of tomatoes with a number of inferior specimens included, he is compelled to raise the price on the remainder to secure his profit, or else pay a lower price for the goods. The increase in the price to the consumer tends to decreased consumption; therefore, it is a decided advantage to pack true to grade and size throughout each case. Remember that "Rubbish ruins reputation"; therefore the first steps in successful marketing are good grading and packing, for they induce confidence in the buyer.

Packing.

Tomatoes should never be packed with stalks adhering to them. By exercising a little care this can be obviated. As with all other fruit, tomatoes must be packed firmly. Loose packing is absolutely fatal for good carriage. The fruit should be packed "diagonally" on its cheek, and in such a manner that no stalk ends can be seen. If cases be packed thus it will be quite immaterial at which part they are opened, for the whole package will present a neat and attractive appearance.

The old systems of packing three tomatoes across the end of the case, and of placing rows down each side, and then filling the centre with small ones to make the pack fit, has been superseded by the diagonal system. The old systems lend themselves very much to "topping"—that is, when the side is taken off the pack may look very nice, but an examination of the contents will reveal numbers of small fruit which have been put in to fill up or make the pack fit. The retail shopkeeper, however, who understands buying fruit is not easily deceived.

With the diagonal system there is no great bulk or heavy weight of fruit resting on any individual fruits, because none rests directly on top of another in any direction. The tomatoes in each alternate layer do not rest directly on top of the tomatoes beneath, but in the pockets or spaces which are caused by the diagonal system of packing.

Tomatoes are probably the easiest of all fruit to pack. All the same, care is required. Some consider that, owing to the irregular shape of tomatoes, it is impossible to pack them as neatly as other fruit. Experience, however, is proving the contrary, and with the diagonal system thoroughly worked out for the tomato case, it is found that all sizes can be properly packed by using not more than nine different counts or packs which will embrace all sizes and shapes of tomatoes, as against twenty-three packs or counts for oranges, which the citrus-grower has to contend with, and twenty-two packs or counts which are used by the apple-grower.

A commencement should not be made from a bench which has simply been filled with tomatoes from the field; if this be done packing will be an expensive operation. The work will be facilitated if the grower makes grading and packing separate operations. Two benches are required—a small one and a large one. These should be placed side by side with room for the sorter to stand between. The small bench should be used to receive the fruit from the field, and the larger, which should be divided into six sections, can be used by the sorter who puts the various grades and sizes into their respective sections ready for packing. The packer stands at the opposite side of the bench, and is not interrupted by fruit coming in from the field.

Some growers may argue that it does not pay to pack tomatoes, and in support of this claim may produce account sales showing no difference in the price of the packed as against tomatoes just filled in with the kerosene tin. It certainly does pay to pack tomatoes, but it is useless to send a few cases of tomatoes correctly packed among a consignment consisting chiefly of unpacked cases, and expect the packed ones to bring more money than the others. A better way is for the grower to standardize his quality and pack, and, as time goes on, he will find he is building for himself a business and a reputation. His name and his goods will become known on the market and eagerly sought for by the buyer.

In addition to neat packing, the height of the fruit in the case before the lid is nailed on is very important. Packing fruit to the correct height and the snugness of the specimens in each layer are important features for its safe carriage over long distances. The fruit should be packed about an inch above the top of the case before nailing on the lid. Officers of the Department of Agriculture recommend that a few hours at least should elapse before nailing the lids on packed cases, so as to allow a little shrinkage of the fruit to take place. Where cases are packed over night, the lids should not be nailed down until the following morning.

Branding.

Branding is generally the final operation with tomato-growers, and a few words in regard to the marking of cases may be useful. Much confusion is sometimes caused through a lot of unnecessary stencil marks. Care should be taken to stencil or label the cases with only

marks essential for identification, such as the agent's name, the size and grade of tomatoes, and the grower's name and address. If the grower has a registered brand there will then be no necessity to brand the full name and address. Cases should be branded in accordance with the degree of ripeness and size of the fruit they contain, such as *medium ripe* 3 *inches and over*, or *ripe* 3 *inches and over*, or *medium ripe* 2 *inches to* 3 *inches*, or *ripe* 2 *inches to* 3 *inches*. Tomatoes under 2 inches in diameter should be marked *small and ripe* or *small and medium ripe*, as may be required. All fruit should be sound and free from disease. Badly deformed and "catfaced" tomatoes should not be placed on the market. All branding should be in letters of not less than $\frac{3}{4}$ inches in height if stencilled on the packages, and not less than $\frac{1}{4}$ inch in height if printed on ticket or label.

Cases and Lining Paper.

The advantage of the use of new white lining paper and new cases in place of second-hand or discoloured cases lined with newspaper is most marked. Although the fruit in both cases may be of the same quality, buyers are always attracted by a new case lined with clean white paper. Details such as these are worthy of note by every tomato-grower.

Summary.

On no account should the lids be nailed on tomato cases immediately after packing; allow shrinkage to take place.

Remember that slack packing results in bruised fruit.

Grade for colour. Sort the coloured from the green tomatoes and pack in separate cases to avoid loss.

Sizing and packing should be treated as separate operations.

It is the size of the "pockets" or spaces between the fruit that regulates the height of the fruit in the case before the lid is nailed on. The last layer should be about three quarters of an inch or even an inch above the top of the case.

Fruit in the second and each alternate layer throughout the case should not rest directly on top of the fruit beneath, but in the spaces, so that no one fruit will press directly on top of another.

The diameter of a tomato is measured from cheek to cheek, not from stem to eye.

A wall sheet showing the different methods of packing tomatoes has been prepared by the Horticultural Division of the Department, and copies may be had free of charge from the Department of Agriculture.

PLANT PATHOLOGISTS' CONFERENCE.

PLANT DISEASES DISCUSSED.

Crown Gall and Powdery Scab.

Convened by the Honorable the Minister for Agriculture, Mr. W. Slater, M.L.A., an Interstate Conference of Plant Pathologists was held in Melbourne towards the end of September. The Conference was presided over by Professor T. G. B. Osborn, representing the Council of Scientific and Industrial Research.

The following official delegates attended:—

Victoria.—Mr. C. C. Brittlebank, Biologist, Victorian Department of Agriculture; Mr. D. B. Adam, Plant Pathologist, Department of Agriculture; Mr. S. Fish, Assistant Plant Pathologist, Department of Agriculture.

New South Wales.—Dr. Noble, Principal Assistant Biologist, New South Wales Department of Agriculture.

South Australia.—Mr. Samuel, Plant Pathologist, Waite Agricultural Research Institute; Mr. Quinn, Chief Horticultural Inspector, Department of Agriculture.

West Australia.—Mr. Carne, Plant Pathologist, Department of Agriculture.

Queensland.—Mr. Simmonds, Plant Pathologist, Department of Agriculture.

Tasmania.—Mr. Nicholls, Micro-biologist, Department of Agriculture.

Commonwealth Plant Quarantine.—Mr. E. Mackinnon, Director of Plant Quarantine.

The Conference was opened officially by the Minister for Agriculture, who pointed out that, at the first of these conferences held in Sydney four year ago, matters of general importance in regard to plant diseases and their control were discussed. At this, the second interstate conference of plant pathologists, two matters of great importance to interstate trade—particularly in relation to potatoes and nursery stocks—were set down for discussion. In regard to the former, the conference would be asked to define the conditions necessary for the development of Powdery Scab, and to determine if those conditions existed in Victoria or other mainland States. If no definite decision could be given on those points it was proposed that they should suggest the steps that might be taken to enable a decision to be reached.

The importance of this question could not be over-emphasized since the future of the interstate trade in potatoes was dependent largely on some definite ruling being given in regard to Powdery Scab. That disease was first recorded in Tasmania in 1915. Two years later the same disease was discovered by Mr. Brittlebank in potatoes from King Island. This discovery was followed by the imposition of an embargo prohibiting the importation of potatoes from Tasmania and King Island. Early in 1918 that proclamation was revoked in respect to Tasmania on an undertaking being given that King Island would be quarantined.

In 1921 further outbreaks of the disease were reported from Tasmania, and it was proposed that the embargo should be re-enacted. At the time nothing was done. Two years later, Mr. Harris, the Senior Potato Inspector, visited Tasmania and reported that the disease existed in various localities there. About the same time the prohibition

against King Island potatoes was partially raised, the island being placed on the same footing as New Zealand. Recently a further important development had occurred in connexion with Powdery Scab, the disease being reported as having been found in potatoes grown in New South Wales.

The second important question that would be discussed by the conference was that relating to Crown Gall or "Hairy Root," in nursery stocks. They would be asked to attempt to differentiate between the conditions caused by that disease and the apparently normal condition of Northern Spy stocks, which showed the same characteristic symptoms. This question was a very live one among nurserymen in Victoria. Numerous consignments of apple trees worked on Northern Spy stocks had been rejected at the Queensland border owing to the alleged presence of this disease, though the Victorian pathologists were convinced that no disease was present, and that failures in Queensland districts had been due to unfavorable soil conditions rather than to any disease of the nursery stocks.

Powdery Scab.

On the first item dealing with the actual seriousness and importance of Powdery Scab of potatoes, Mr. Adam (Victoria) outlined the information contained in overseas publications. This information, he said, showed that sometimes considerable losses in yield were experienced as a result of the disease, particularly on the west coast of Ireland and in certain of the northern counties of England.

Mr. H. M. Nicholls (Tasmania) outlined the history of the disease in Tasmania from its first record in 1915. From very careful examination of potatoes from all sources, he found that they came from wet districts especially in cold and damp gullies. He had received the following specimens in each of the following years:—1920, thirteen specimens; 1921, nine specimens; 1922, seven specimens; 1923, fourteen specimens; 1924, four specimens; 1925, three specimens; 1926, three specimens; 1927, four specimens. These included not only those found by the inspectors in the consignments intended for export, but those in the field, and he considered they represented the total number of affected potatoes.

On one occasion some years ago it was suggested to the Department that they should try some experiments in controlling this disease, and a difficulty that had not been thought of was found—the difficulty of getting any material for infection purposes. He had obtained eight tubers, which he divided into four lots of two each, treated as follows:—(1) Bi-chloride of mercury; (2) sulphur; and the others were used as control. They were planted in the wettest portion of his garden, and grew excellently, without a trace of powdery scab even in the controls.

Mr. Brittlebank (Victoria) stated that out of 115 consignments of potatoes from Europe and elsewhere, in only two cases had he failed to find the disease.

Mr. Adam read a report from Mr. Harris (Senior Potato Inspector) giving an account of the distribution of the disease in New Zealand.

Dr. Noble (New South Wales) gave an account of this disease in his State. Powdery scab, he said, was found recently in a number of tubers grown at Guyra, on the northern tablelands, 3,000 to 4,000 feet above sea level, with a fairly good rainfall. It was not a serious outbreak so far as a large portion of the crop was concerned. Forty bags were affected, and the disease was restricted to a waterlogged portion of the

field. Dr. Noble pointed out that, in America, teachers of pathology had some difficulty in obtaining specimens. In Minnesota, an affected State, they could not find a single specimen while he was there.

Mr. Brittlebank pointed out that the Victorian potato-growing districts were situated in the wettest and coldest districts round Ballarat, Bungaree, Bullarto, and on the hills of Gippsland, where they had about 40 or 50 inches of rainfall. He counselled the greatest care in arriving at decisions.

Mr. Samuel (South Australia) said that the disease occurred in Algeria, India, and in Peru, where potatoes are grown at considerable altitudes. The disease had been found on a native variety of potatoes; possibly it originated there.

Mr. Mackinnon (Federal Quarantine) mentioned that "canker" was a very serious form of this disease which, though not produced in America, was found in England, Ireland, Scotland, and many European countries where there was a long growing season.

Mr. Adam described his visit to Tasmania in the potato areas and the result of his examinations, which showed that 5 per cent. of one crop inspected was affected by disease, and of this lot fully 1 per cent. would have to be rejected on account of powdery scab.

Mr. Adam submitted evidence as to the environmental conditions necessary for the production and development of powdery scab. Evidence from experimental work, he said, had shown that, in one instance where plantings had been made at twelve points on the Atlantic coast from Massachusetts to Florida, none of these produced infected potatoes. An account was read of an experiment conducted at Maine by G. B. Ramsay, where pots of soil with different quantities of water were held at three different temperatures, namely, 60 deg., 70 deg., and 80 deg. F. Five out of six pots, containing potatoes at 60 deg. with abundant to medium moisture, developed the disease—all others remained free.

The second type of evidence on which an opinion could be based was the distribution of this disease. The climatic conditions of the countries from which powdery scab had been reported were outlined, and a chart to show the temperature conditions in certain parts of the world where the disease exists was exhibited.

Mr. Simmonds (Queensland) said he understood that in America and Europe they found the occurrence of Corky Scab coincided very closely with the areas in which Irish Blight was serious.

Mr. Mackinnon stated that, in correlating this information with disease occurrence, attention must be given to such questions as soil acidity, &c.

Dr. Noble remarked that the disease developed only in one section of the diseased field at Guyra, where the water ran down the hills and produced a certain amount of waterlogging. Personally, he thought the water relationship one of paramount importance. The conditions in 1926-27 observed in the area in New South Wales where the disease was found were as follows:—

Rainfall.	Average mean temperature.
August—106 points below the average	50
September—149 points below the average	53
October—117 points below the average	61
November—749 points, 4 inches above the average ...	66
December—565 points, little over the average ...	67
January—747 points, 3 to 4 inches above average ...	67

The outstanding features were that, while the mean temperature was somewhat below average, the rainfall was considerably in excess during the critical early growing period.

After general discussion it was left to a Drafting Committee, consisting of Dr. Noble, Mr. Mackinnon, Mr. Adam, and the Chairman, to prepare resolutions for submission to the conference.

The motion in the form set out below was carried unanimously:—

Whereas Powdery Scab (Spongospora subterranea) is a disease which is widespread throughout many potato-growing areas of the world and appears to cause most damage under environmental conditions which include low temperatures and water-logged soils during the early period of growth of the potato; and whereas it has not yet been recorded from certain important sections of the potato-growing areas of the Commonwealth, it is resolved:—

1. *That additional information is desired as to the possibility of its further development in the Commonwealth, and that this information could best be obtained by controlled soil temperature and moisture studies.*
2. *That a Committee should be established consisting of a Plant Pathologist from New South Wales, Victoria, and Tasmania, and a representative of the Council of Scientific and Industrial Research (Chairman), whose duty it should be to draw up a programme of research work and take all possible steps to have it carried into effect.*
3. *That it is desirable, pending the results of the investigation, for steps to be taken by the interested States to prevent the introduction of Powdery Scab into those districts in which this disease is not yet known to occur.*

Co-operation between States.

Some time was given to a discussion of the items relating to better co-operation between the States in providing information as to the occurrence, for the first time, of important diseases. It was generally felt that, though the various plant pathologists of Australia were working in comparative isolation, they were often dealing with the diseases of the same crop plants. Fungi knew no State boundaries, and it was often a matter of great importance to know promptly of—(1) the appearance of a new parasitic fungus; (2) the epidemic outbreak of an established parasite and the meteorological and other data in connexion with such an outbreak; (3) the parasites found on crop plants during any year.

It was hoped that the free exchange of such information would be in accord with a resolution adopted at the Interstate Conference of Ministers of Agriculture. The forming of a resolution was left to the drafting committee.

The following motion was considered and adopted unanimously by the Conference:—

Whereas at the Interstate Conference of the Ministers of Agriculture, held at Sydney in May, 1924, *it was resolved that " The Committee*

confirm the desirability of prompt exchange of information regarding the outbreak of serious fruit or plant diseases," it is resolved:—

1. *That Plant Pathologists of the different States be instructed to prepare without delay for such interchange information as to the occurrence of any new or serious disease that may be diagnosed in their respective States.*
2. *That it is desirable to exchange between the pathological branches in the different States the monthly, quarterly, or other reports on plant diseases prepared for the International Institute of Agriculture at Rome.*
3. *That the Plant Pathologists of all the States agree to prepare for publication, as soon as possible, a plant disease census indicating the occurrence, distribution, and severity of plant diseases in their respective States.*

Plant Quarantine.

Reviewing a resolution of the Interstate Conference, held in Sydney on 1st September, 1923, which related to plant quarantine, Mr. Mackinnon said that the Commonwealth Plant Quarantine Department was taking steps to establish plant quarantine stations. For the present, one would be established for tropical fruits in a tropical area, and another in the temperate region for raising temperate climate crops.

"Spotted Wilt" in Tomatoes.

Relative to a resolution regarding "spotted wilt" in tomatoes, Mr. Samuel stated that the Waite Institute in collaboration with the Council for Scientific and Industrial Research was undertaking an intensive research into various aspects of the disease "spotted wilt" of tomatoes. It was too early yet to give any results.

Brown Rot of Peaches.

In regard to brown rot of peaches, Mr. Fish outlined the history of the disease in Victoria and its present distribution. He described the experimental work at present in hand, and indicated that a spray schedule consisting of lime sulphur wash 1-9 as the buds swell, 1-35 at pink bud stage; and 1-80 as the fruit begins to colour, and 1-100 three weeks before the fruit is to be picked, had given the most satisfactory results.

Dr. Noble stated that they had had no trouble from Brown Rot in New South Wales for a number of seasons.

Mr. Samuel said that the disease was unknown in South Australia, although it had been recorded as occurring there by Mr. McAlpine.

Mr. Carne stated that it was unknown in Western Australia.

Crown Gall and Hairy Root.

A long discussion was aroused by the two following items, which were taken together:—

"The relative seriousness of definitely diagnosed Crown Gall and Hairy Root in apple stocks in the establishment of an orchard."

"Differentiation of Crown Gall from callus and Hairy Root from normal rooting in Spy stocks."

Dr. Noble described the different types of gall and their etiology—crown gall and burr knot galls. He did not know of any one who had definitely proved that the crown gall organism was the cause of hairy root. Some years ago in America observers met in conference to discuss the crown gall situation, and the results were published in the proceedings of the American Nurserymen's Association. The report contained observations on the relative seriousness of crown gall and hairy root, and, as was to be expected, there was a great diversity of opinion. In some cases it was actually stated that plants apparently affected with crown gall were planted in various sections of the United States, and the trees seemingly did not suffer at all as the result of the crown gall infection.

At a later examination, on lifting the roots, it was found that the gall had disappeared. In other cases crop capacity and the general vigour of the trees were affected by the crown gall. Much the same sort of thing had been experienced in New South Wales. Although an exhaustive examination of the situation had not been made, there were instances in which trees had been affected with crown gall for a number of years, and had not suffered materially as the result of that infection. In the cases of nursery stock, on the other hand, if the crown gall was able to develop at the crown, the trees had suffered and in some cases had been killed. It was known that a pseudo-crown gall effect could be produced. He wished to know how far that condition had been confused with the true crown gall. In New South Wales the hairy root condition was sometimes confused with the type of root characteristic of Melbourne stocks. He personally was doubtful about the hairy root condition as diagnosed by border inspectors. Perhaps sometimes it was merely the normal root of this particular type of stock. On the surface it would appear, in confirmation of the experience elsewhere, that the hairy root condition was not a serious abnormality.

Mr. Brittlebank outlined the history of the crown gall problem from 1916. In that year the New Zealand authorities took the view that Victorian apple stocks were affected by the crown gall and hairy root caused by *Bacterium tumefaciens*. In association with Mr. Cockayne, he worked for a month with Professor Champtaloup and an assistant, and they had isolated from Victorian stocks some bacteria. Subsequently neither he nor the New Zealanders were able to produce galls when these bacteria were inoculated into Paris daisies, tomatoes, &c. Professor Champtaloup later received a culture of *B. tumefaciens* from America, which, when inoculated into Paris daisies, &c., produced "nice experimental tumours." They thus failed to prove that they had isolated typical crown gall organism from Victorian stocks.

Continuing, he stated that the New Zealanders had selected, prior to his visit to New Zealand, 50 trees, the worst possible ones from the importations from Victoria. These had been planted at Wallacedale in an acre of land, together with 50 New Zealand trees, to show the superiority of New Zealand trees over those imported from Australia. At the time of his visit, the so-called diseased trees had outgrown the New Zealand trees.

Later, visiting Queensland, in conjunction with Mr Simmonds, he went over a number of trees. The alleged diseased trees were taken out; he referred to Mr. Simmonds for further views. A great many root-grafted stocks showed callus resembling crown gall. In certain soils like those at Gembrook, or on free soil in a wet district, roots

developed high up about the base of the tree. He thought that there was absolutely no evidence of injury by crown gall in any orchard in Victoria.

Mr. Quinn pointed out that the two items on the agenda paper referred only to the apple tree. So-called crown gall was most noticeable on stone fruits and some pears in South Australia.

Mr. Fish, supplementing remarks by Dr. Noble, read reports from America and England showing that definitely diagnosed crown gall was responsible for practically no losses in apple trees.

Mr. Mackinnon pointed out that there was a very useful summary by Melhus of the position in the *Journal of Economic Entomology* of April, 1926. In reply to Dr. Noble, he referred to a hairy root condition definitely due to a bacterium which was described in general terms in the article mentioned. Dr. Noble, however, knew of no published records of experiments of a bacterial infection producing hairy root.

Mr. Samuel thought that the general opinion of plant pathologists was that hairy root was not considered of much importance on apples.

Mr. Simmonds said that a distinction between crown gall and hairy root due to *B. tumefaciens* and crown gall and hairy root due to other causes had only been made during the past two to three years. The reports of earlier workers were therefore of little use in deciding the question of the seriousness of definitely diagnosed crown gall and hairy root, as required by the item under discussion. As it was, support was given about equally for both sides of the question. They had not so far, in Queensland, isolated any organism from hairy root on apples. However, the amount of work carried out had been small owing to the lack of time and facilities. In Stanthorpe district, examination of successive trees in any row, grown under similar cultural and soil conditions, usually revealed close correlation between type of root system and growth of the individual plants. Stunted plants usually showed more hairy root and lack of development of main feeding roots. There was no evidence as to the condition of this stock when it arrived in Queensland some years ago. The suggestion was that there was more marked individual variation in the amount of hairy root present then than was to be noted in some of the more recent consignments. In a few cases growers had marked certain trees at planting time on account of their excessive hairy root development. These trees usually showed a distinctly stunted condition in comparison with the rest of the orchard after some years' growth. He said that, as far as he was aware, departmental experiments had not been carried out in connexion with the effect of hairy root on growth of apple trees.

Mr. Adam stated that it was evident that the Queensland growers had trouble with some of the trees they obtained from Victoria, and were anxious to find out what was the cause of that trouble. Queensland authorities considered that it was due to crown gall caused by *B. tumefaciens*, for which, in the absence of definite diagnosis, there was no evidence. There was evidence that the soil at Stanthorpe was poor and sandy. Referring to the work of the East Malling Station (Kent, England), figures were quoted to show that a dwarfing stock produced a very unprofitable tree on sandy soil, whereas a vigorous

stock worked with the same scion produced a tree as vigorous as those produced by the dwarfing stock on a good class of soil, and very much better than the tree produced by the dwarfing stock on sandy soil. These dwarfing and vigorous types of the one variety of stock were scarcely distinguished fifteen years ago. They knew nothing of the Northern Spy stock in terms of the East Malling result, but observations indicated that it was not a vigorous type. Possibly it was not suited to the soil conditions at Stanthorpe, and that alone would account for the poor growth and root development described by Mr. Simmonds and ascribed, Mr. Adam thought wrongly, to *Bacterium tumefaciens.*

The question of stocks, particularly the Northern Spy stock, was fully discussed by Mr. Quinn and others.

No further points being raised, the meeting adjourned while a resolution embodying the opinions of the Conference on these two items was prepared. This was submitted in the terms given below and carried unanimously:—

Whereas there is no evidence that definitely diagnosed crown gall caused by Bacterium tumefaciens is a series disease in the establishment of an apple orchard in Australia; and whereas there is evidence that a form of root development occurs in certain types of soil in which numerous fine roots are produced resembling the condition known as hairy root attributed to the action of Bacterium tumefaciens; and whereas there is evidence that different types of stock profoundly affect the growth of apples trees in various classes of soil, it is resolved—

1. *That it is desirable that more attention be given to determining the etiology of gall and hairy root conditions found on apple trees in Australia.*
2. *That tests should be initiated to determine the behaviour of different varieties and types of stock used for the apple on various classes of soil.*

THE EFFECT OF ENVIRONMENT.

The effect of a marked change of conditions, such as from a hot to a cool climate, from acid to calcareous soils, from plains to hills, &c., is so very great with most domesticated animals and plants that those individuals submitted to it, particularly if they be bred and reared in the changed conditions, develop differently from the original stock, and to such an extent as to be at least as distinct from their ancestors as a different strain, and in some cases as distinct as a different breed. The environmental effect on the development and breeding powers of animals is so great that individuals of the same blood, reared in separated localities, where the natural conditions are unlike, behave in breeding as if there was no blood relationship between them.—*South Australian Journal of Agriculture.*

FROSTS AT MILDURA.

Damage to Vineyards.

The severity of the frosts that devastated vineyards in the Mildura and other districts recently, and the extent of the damage inflicted on the vines are indicated in a report submitted to the Honorable the Minister of Agriculture, Mr. Slater, by Mr. F. de Castella, Viticulturist of the Department of Agriculture, who visited the vine-growing districts to make a survey of the damaged vineyards and to assist in assessing the damage caused by the frosts. In his report, Mr. de Castella points out that these frosts constituted the most severe visitation in the history of the district. The frosts had not been unexpected, as most growers recognized the great danger of frosts in a dry season such as the present one. As a matter of fact, a warning had been broadcast by him in a wireless talk a few days before the frosts occurred, and the value of "smudge" fires in lessening possible damage was stressed.

The visitation, Mr. de Castella points out, was a black frost, hence its unusual severity. In some cases, areas of approximately a square mile and over had been completely burnt. Such areas were to be found in the Irymple valley at Merbein, and in a somewhat irregular form at Cardross. Apart from these large areas, the damage was patchy, valleys being affected and rises more or less untouched. In some cases, however, comparatively low land escaped and rising land suffered. In view of the variable and patchy nature of the damage it was impossible to assess it accurately at that stage. In some cases there would be recovery, but its extent could not be forecast at the time. Until the results of the survey then being made were known, any estimate must be largely conjectural, but the loss for the whole district would amount to probably 50 per cent. Many vineyards had lost the entire crop, while some had escaped altogether. Sultanas had suffered most severely, but currants had been damaged also—in some cases severely. Gordos, Walthams and Doradillos, which sprout later, had mostly escaped. Steps to obtain a supplementary crop by repruning were suggested by Mr. de Castella, who stated that, with some vine sorts, a half crop and even more could thus be obtained. (The method is fully described in a bulletin available free from the Department of Agriculture.)

Unfortunately the Sultana does not respond in this way, as its secondary sprouts bear no fruit. On completely frosted vines recovery can be only from the few dormant buds on the basal half of the rods left at last winter's pruning. Owing to this season's excellent bud burst these dormant buds are not numerous. These were already breaking at the time of Mr. de Castella's visit, and some of them showed fruit. In some cases, and especially on vines of medium strength, it might prove advantageous to shorten back the rods to about half their length. This would render the sprouting of the dormant buds more certain.

As regards future action to obtain some protection against frosts, Mr. de Castella suggests that consideration should be given to the more

systematic use of "smudge" fires. In a few cases individual growers obtained positive results by "smudging" during the recent frosts, but it is pointed out that community action in this regard would result in much more complete protection. Steps are being taken at Mildura for organization on these lines immediately, as it is recognized that the danger of further frosts is a very real one. October is the month during which frosts are usually feared.

"CATCH" CROPS.

In order to assist growers who had suffered most severely to choose some "catch" crop that might be sown to help to tide them over the season, two departmental officers, Messrs. L. C. Bartels, B.Ag.Sc., Senior Irrigation Officer, and P. Ryan, B.Ag.Sc., Inspector of Agriculture, visited Mildura and consulted with those growers. Their report is as follows:—

"Summer crops may be sown and high yields will be obtained if attention is paid to watering and inter-row tillage. Where small unoccupied areas are available on the blocks these should be sown, and, at the discretion of the growers, some of the space between rows of frosted vines might be utilized in the emergency which has arisen.

As green fodder crops, the sorghums and maize are the best under present conditions. Representatives of the sorghums are Sudan grass, ambercane and imphee, all of which were recommended.

Sudan Grass.

Sudan grass will be very useful as fodder. It is finer than the other sorghums. It will give at least three crops of good fodder which may be fed green or cured as hay. It is best cut when in head. It will grow 5 feet high or more. It may be sown in rows 3 feet apart or drilled in with the seed drill in close rows. If the drill is used, an easy method of sowing is to mix the seed with superphosphate just prior to seeding and sow through the manure run of the drill. If sown in rows 3 feet apart, 3 to 5 lb. of seed per acre is required, but if drilled in close rows 12 lb. of seed should be sown. The closeness of sowing will determine the quality of the hay, but Sudan grass stalks do not become thicker than a quarter of an inch.

Sudan grass grows under a variety of conditions. It likes warmth and moisture, but will live through dryness. It has a high feeding value, and if seed is obtained from reliable sources it will not bring in Johnson grass.

Ambercane and Imphee.

These sorghums grow taller and coarser than Sudan grass, although they may be used when 2 or 3 feet high. They are very productive, sweet and nutritious. Sown in rows, 10 or 12 lb. of seed will give a thick planting. The seed may be sown by hand in furrows to make single or double rows, but a little superphosphate, say, half a lb. to the chain, should be sprinkled in the furrow. The furrows should be lightly covered. Under proper treatment ambercane and imphee should easily yield 30 tons of green feed per acre at Mildura.

Maize.

Maize is recommended for fodder and grain. For grain, the rows are spaced usually 3 feet apart, and the grain is planted in hills. This permits intercultivation in two directions, but if a couple of rows were planted between vines, single seeds could be dropped a foot to 18 inches apart in the rows. Any of the Dent varieties except the early maturing ones are suitable for dual purposes. For grain, 12 lb. of seed, and for fodder half a bushel of seed may be put in.

Millet.

Millet may prove useful. It is an abundant and rapid grower, and may be sown for fodder, particularly in the moister sections of the block. Sow in strips at the rate of 8 lb. to 10 lb. per acre, and 3 lb. per acre in rows.

French Beans.

Inquiries were made regarding French beans and the possibilities for pod and seed production. It was suggested that they offer possibilities for the local market, but their culture calls for more or less specialized treatment and a limited area only in successive sowings was recommended. Sow in rows 2 ft. 6 in. apart, and 4 inches in the rows. A bushel of seed per acre should suffice.

Mangels.

Evidence was given that mangels will grow well at Mildura, where there are slight traces of salt. It was suggested that if these were tried, the seed should be put in in rows 2 ft. 6 in. apart, at the rate of about 6 lb. of seed per acre. The young plants should be thinned to spacings of 15 inches.

Artichokes.

An inquiry regarding artichokes was included. It was pointed out that it is sometimes difficult to eradicate the plants, and they may become a pest. The tubers are planted 2 ft. 6 in. apart in rows 2 ft. 6 in. from each other.

Lucerne.

It was noted that some stock-holders have small areas of lucerne, and it was suggested that, if a small area of this valuable plant could be laid down, it would provide for contingencies like the present. Autumn sowing was recommended on a good seed bed, and we advised that headlands, &c., could with advantage be occupied.

Several inquiries *re* other crops included vetches, berseem, &c., which could not be planted now to best advantage."

STALLION REGISTER, 1927-28.

Under the "Horse Breeding Acts 1919-1925."

Part 1.– Registration prior to 31st July, 1927.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
435	Aird Laddie ..	A	Draught ..	Yeoman, E. ..	P.B., Echuca
96	Al Borak ..	A	Light ..	Bennett, L. ..	Robin Vale
134	Allan Stewart ..	A	Draught ..	Croxford, N. R.	Violet Town
364	Almore	5	,, ..	McFarlane, C. S. B.	Hopetoun
360	Amyville Fashion	4	,, ..	Williams, C. ..	Thornton
250	Angle Jack ..	A	Light ..	Hillas, C. T. ..	Double Gully, Tallangatta
284	Athlete	A	,, ..	Hobson, G. ..	Sale
32	Avon Dale ..	6	Draught ..	Fowler, E. ..	Anakie
146	,, Lea ..	A	,, ..	Leitch, J. ..	Wodonga West
377	Bangaroo Honour	4	,, ..	Schulze, C. A., junr.	Jeparit
52	Bannockburn ..	A	,, ..	Francis, G. W. ..	Lower Norton, via Horsham
135	Barney II. ..	A	Light ..	Thomson, A. W.	Hamilton
147	Baron	A	Draught ..	Deacon, J. ..	Sheep Hills
226	,, Cedric ..	6	,, ..	Luckie, Geo. ..	Springhurst
97	,, Clover ..	A	,, ..	Lord, J. ..	Boigbeat
370	,, Dale ..	5	,, ..	Hancock, F. ..	Aubrey
315	,, Darnley ..	3	,, ..	McManus, G. E...	Sea Lake
68	,, Douglas ..	6	,, ..	Buckley, T. ..	Romsey
218	,, Fenwick ..	A	,, ..	Wilson, H. C. ..	Raywood
18	,, Fenwick ..	A	,, ..	Gardiner, W. ..	Waaia
395	,, Fyvie ..	5	,, ..	Murphy, C. ..	Benalla
438	,, Jim ..	3	,, ..	Pearse Bros. ..	Kewell North
169	,, Lee ..	A	,, ..	Beechy, J. ..	Terang
69	,, Lee ..	A	,, ..	White, J. D. ..	Box 97, Minyip
136	,, Major ..	A	,, ..	Krelle and Henke	Boolite
300	,, May ..	A	,, ..	O'Berin, H. W. ..	Goornong
373	,, Newfield ..	5	,, ..	Jardine, W. ..	Rathscar
281	,, of Dalmore	A	,, ..	Henty, J. R. ..	Pakenham
443	,, Pettie ..	4	,, ..	Price, J. ..	Mologa
148	,, Prince ..	A	,, ..	Banko, R. P. ..	Simmie P.O.
33	,, Regulus ..	6	,, ..	Dolman, J. A. ..	Neilborough
70	,, Silk ..	A	,, ..	Cameron, K. ..	Warracknabeal
34	,, Stewart ..	A	,, ..	Day, R. ..	Nathalia
149	,, Wattee ..	A	,, ..	Nagorcka, F. ..	Tarrington
19	,, Weerite ..	A	,, ..	Manifold ..	Weerite
455	,, Willie ..	4	,, ..	Holden, D. ..	Katunga
386	Baron's Best ..	3	,, ..	Meyer, J. H. ..	Kaniva
71	,, Favourite	A	,, ..	Cameron, K. ..	Warracknabeal
285	,, Pride ..	A	,, ..	Quinn, J. J. ..	Elmore
192	,, Reserve ..	A	,, ..	Barslett, T. G. ..	Gerang Gerung
271	,, Star ..	A	,, ..	Oman, G. ..	Lismore
150	Basella	A	Thoro'bred	O'Halloran, R. ..	Granya
144	Beau Fils ..	6	,,	Trustees late W. E. Mitchell	Corryong
191	Bell Boy ..	A	Light ..	Turnbull, A. G...	Coleraine North
219	Belmain ..	A	Draught ..	McKie, J. ..	Sea Lake

Stallion Register, 1927–28—*continued.*

Cert. No.	Name.	Age	Class.	Owner.	Address.
		Yrs.			
175	Belmont Print ..	6	Draught ..	Egan, J. M. ..	Woodleigh
72	Belmont's Champion	A	,, ..	Collins, F. ..	Berriwillock
376	,, Pride ..	3	,, ..	Parker, T. ..	Pepper's Plains
224	Ben Lomond ..	4	,, ..	Galloway, J. ..	Majorca
151	,, Model ..	A	,, ..	Adams, H. ..	Yaapeet
220	Billy Culloden ..	A	Light ..	McDougall, D. ..	Glenhurst, Macarthur
251	Blackadder ..	A	Thoro'bred	Hoysted, H. & F.	Wangaratta
225	Black Jack ..	3	Pony ..	Jukes, R. W. ..	Maryborough
4	Blackthorn of Penniwells	5	,, ..	McClellan, Mrs. J.	241 Dandenong-rd,. Windsor
421	Bobbie	A	,, ..	Barrett, E. ..	Traynor's Lagoon
73	Bobniak ..	A	Light ..	Clarke, H. F. ..	Miepoll
201	Bobs	5	Draught ..	Allen, A. O. ..	Murrayville
152	Bold Action ..	A	,, ..	Culloden, L. ..	Jung
294	,, Arthur ..	A	,, ..	Galloway, Jas. ..	Majorca
321	,, Briton ..	4	,, ..	Dyke Bros. ..	Gre Gre Village
385	,, Cavalier ..	3	,, ..	Hicks, G. ..	Miram
442	,, Douglas ..	A	,, ..	Wilkinson, W. G.	Yarrawonga
333	,, Newton ..	A	,, ..	Roche, H. ..	Brocea, via Casterton
74	,, Rowan ..	A	Light ..	Bridges, J. H. ..	Drummartin-street, Sunshine
369	,, Squire ..	4	Draught ..	Schmidt, G. E. ..	Kellalac
407	Bolwalla ..	A	Thoro'bred	Harris & Dunne	Warrnambool
153	Bombay ..	A	Light ..	Henna, P. ..	Terang
368	Bonnie Arthur ..	5	Draught ..	Marsh, A. R. ..	Lah, via Warracknabeal
193	,, Baron ..	A	,, ..	Scott, R. N. ..	Kongwak
422	,, Brae ..	A	,, ..	Goldsmith, H. ..	Corack
20	,, Caesar ..	A	Light ..	Campbell, C. ..	Lubeck
397	,, Director ..	3	Draught ..	Feldsmann, C. H.	Major Plains
221	,, Knight ..	A	,, ..	Gerrard Bros. ..	Mangalore West
101	,, Salisbury	A	,, ..	Feldtmann, C. H.	Major Plains
459	,, Vale ..	3	,, ..	Boyd, H. ..	Avonmore
336	,, Viceroy ..	6	,, ..	Bunge, J., & Sons	Sheep Hills
344	Bonny Don ..	4	Light ..	Boyd, A. ..	Thalia
98	,, Mac ..	A	Draught ..	Hodges, W. ..	Macarthur
286	Bramhope Parthian	A	,, ..	Lincoln, R. ..	Portarlington
332	Breastknot ..	A	,, ..	Moll, G. J. ..	Dimboola
465	Brewar's March ..	6	Light ..	Nunan, G. ..	Cobram
253	Brigham's Pride ..	6	Pony ..	Rodgers, W. ..	Russell's Creek, via Warrnambool
11	Bright Star ..	A	Draught ..	Dyke Bros. ..	Gre Gre Village
222	,, Voyage ..	A	Light ..	Russell, J., junr.	Orbost
307	British Oak ..	3	Draught ..	Fisher, L. ..	Panitya
358	Briton's Bold ..	4	,, ..	Lennecke, F. W.	Detpa
375	,, Fame ..	3	,, ..	Schulze, C. A., junr.	Hounsells, L.B.
334	Brogyntyn Handyman	A	,, ..	Byrne, G. L. ..	Kewell North
35	Brown Brilliant ..	A	,, ..	Bartlett, J. T. ..	Barnawartha
464	,, Lad ..	A	,, ..	Turner, T. H. ..	Wycheproof
156	Bucklyvies Choice	A	,, ..	Westendorf, W. J.	Dimboola
137	Bundoran ..	A	Light ..	Graham, A. ..	Bacchus Marsh

STALLION REGISTER, 1927-28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
394	Burnside Baron ..	4	Draught ..	Younger, H. C.	Greta
254	Bute Laddie ..	A	,, ..	Crawford Bros. ..	Tatura
203	Canny	A	Thoro'bred	Griffiths, T. A. ..	Eleven Mile Creek, Glenrowan
255	Captain Black ..	A	,,	Flanagan, J. ..	Omeo
371	Carlesberg Prince	5	Draught ..	Freyne, E. ..	Kilmore
405	Castledale ..	6	,, ..	Stokes, S. ..	30 Islington-street, Collingwood
176	Centredale ..	A	,, ..	Opie, J. ..	Werribee
423	Chal	A	Thoro'bred	Connor, W. T. ..	Londrigan
324	Child Zebra ..	5	Light ..	O'Bree, J. T. ..	Narrung, via Piangil
363	Clan Campbell ..	5	Draught ..	Newitt, G. ..	Sheep Hills
75	Claymore ..	A	Pony ..	Hanrahan, J. P.	Ballan
76	,, Junior ..	A	,, ..	Hanrahan, J. P.	Ballan
223	Clyde	4	Draught ..	Shortridge, T. ..	Box 74, Ouyen
424	,, Boy ..	A	,, ..	Goldsmith, H. ..	Corack
367	Coast Guard ..	5	,, ..	Arnold, A. ..	Werrigar East
260	Cock Robin ..	A	,, ..	Croft, L. ..	Orbost
36	Colonel Young ..	A	,, ..	Marshall, W. G.	Glenalbyn
337	Comet	6	,, ..	Henderson, W. ..	Grasmere
16	Commodore Nut ..	A	Pony ..	Manifold, junr. ..	Purrumbete, Weerite
17	Commonweal ..	A	Draught ..	Holt, W. C. ..	Foster
351	Cooring Dale ..	4	,, ..	Hamilton, A. N.	Bannerton
361	Corrong Chief ..	5	,, ..	Robins, C. T. ..	Hopetoun
312	Count Abbey ..	5	Light ..	Currie, J. ..	c/o A. J. Glenn, Birchip
77	,, Bingen ..	A	,, ..	Porker, M. G. ..	Pepper's Plains
448	Craig Avon ..	5	Draught ..	Walter, W. ..	Tatura
227	Craigie Masterstroke	A	,, ..	Arnold, A. ..	Werrigar East
78	Crighton's Tim ..	A	Pony ..	Greaves, S. A. ..	Narre Warren
418	Cymro Bach ..	A	,, ..	McKenzie, C. B.	Yarram
384	,, Harold ..	3	,, ..	Boyle, E. J. ..	Box 16, Kaniva
138	Dalmore ..	A	Draught ..	Woods, H. ..	Bangerang
322	,, Dan ..	4	,, ..	King, W. H. ..	Ultima
316	,, O'Connell	3	,, ..	King, W. H. ..	Ultima
177	,, Pride ..	A	,, ..	McAlpine, W. T.	Lascelles
202	Dalmore's Choice	6	,, ..	Turnbull, A. G...	Winnieburn North Coleraine
408	Dandy Duke ..	A	Pony ..	Kong Meng Bros.	Longwood
272	,, O ..	6	,, ..	Forsyth, J. ..	Murrayville
79	Darling's Comet ..	A	Draught ..	Brock Bros. ..	Moe
357	Dave Douglas ..	4	,, ..	Schulz, B. ..	Ni Ni Well, via Kiata
299	Deck Top ..	A	Light ..	Mackin Bros. ..	Korong Vale
256	Desert Flower ..	A	Pony ..	Mann, A. ..	Walwa Park, Walwa
257	Dimboola ..	A	Thoro'bred	Rogers, W. ..	Russell's Creek, Warrnambool
99	Direct Argot ..	A	Light ..	Matchett, R. ..	Adelaide Hill Stud Farm, Bendigo
80	Donald's Best ..	A	Draught ..	Kelly, D. ..	Kunat
228	Don Alto ..	A	Light ..	Luckie, G. ..	Springhurst
195	Donnibristle ..	A	Draught ..	Wilson, J. G., for Trustees Wilson Estate	Home Station, Milawa

STALLION REGISTER, 1927-28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
194	Douglas Chief ..	A	Draught ..	Graham, C. A. ..	Rupanyup
445	Drum Major ..	3	,, ..	Brunt, R. S. ..	Kyabram
37	Drumore ..	A	Thoro'bred	McPhee, junr. ..	Inverness, Merino
207	Drumry Equipment	A	Draught ..	Maher, J. ..	Tatura
338	Drysdale ..	A	,, ..	Crozier, Wm. ..	South Morang
379	Dunira James ..	4	,, ..	Allen, G. H. ..	Box 83, Beulah
157	Dunure Blend ..	A	,, ..	Hehr Bros. ..	Woolert
21	Earl Direct ..	6	Light ..	McClelland, F. ..	Boort
458	Earlstone ..	3	Draught ..	Boyd, H. ..	Avonmore
282	Eastern Star ..	A	,, ..	McLean, L. G. ..	Culgoa
258	Eaton's Pride ..	A	,, ..	Grey, G. ..	Branxholme
158	El Dorado ..	A	Thoro'bred	Healey, F. B. ..	Kaniva
229	Erigator ..	A	Draught ..	Whinfield, R. ..	Bamawn
139	Ettrick Dale ..	A	,, ..	Fuzzard, J. ..	Numurkah
287	Everlasting Dale..	6	,, ..	Pizer, W. ..	Kyneton
22	Excel	A	Pony ..	Holt, W. C. ..	Foster
12	Fabrikoffs Heir ..	A	Draught ..	Cheeseley, W. ..	Barnawartha
179	Factotum ..	A	,, ..	Grimmer, R. ..	Wickliffe
444	Famous Voyage ..	5	Light ..	Beaumont, P. ..	Ouyen
329	Fashion Bow ..	6	Draught ..	Leathart, H. H.	Middle-road, South Camberwell
306	Fashion's Pride ..	3	,, ..	Pilgrim, R. J. ..	Gre Gre Village
273	Favorite Bold ..	6	,, ..	Jeffrey, A. C. ..	Tallygaroopna West
261	Federal Duke ..	A	,, ..	Thompson, V. ..	Glenalbyn
81	Federation ..	A	Pony ..	Cannon, A. J. ..	Irrewillipe East
450	Field Rover ..	5	Thoro'bred	O'Keefe, J. ..	Shepparton
304	Fine View Baron Royal	4	Draught ..	Gibbins, W. H.	Galah
82	Firebrick ..	A	Light ..	Higgins, P. ..	Heyfield
432	First Grattan ..	A	,, ..	Chisholm, J. I. ..	Cranbourne - road, Dandenong
420	Flashdale ..	A	Draught ..	Bagnell, T. ..	Yarrawalla
53	Flash Donald ..	A	Light ..	Jolly, C. A. ..	Woomelang
308	,, Garland ..	A	Draught ..	McKenzie, J. R.	Pinnaroo
9	,, Pettadale ..	3	,, ..	Stokes, A. ..	3 Bloomberg-street, Abbotsford
409	Footnote ..	A	Thoro'bred	Shaw, G. ..	Yarram
208	Foreman ..	A	Draught ..	Morton, E. ..	Drouin
140	Free Scot ..	A	Light ..	Baulch, S. ..	Orford
461	Gallant Jock ..	A	Draught ..	Hooper, W. ..	Bungeluke
209	Glen Alto ..	A	Pony ..	Dale, B. ..	Albury
425	,, Arthur ..	A	Draught ..	Thomson, H. K.	Newlyn
419	Glengarnock ..	A	,, ..	McKenzie, B. ..	Bass
83	Glen Isla ..	6	,, ..	Perry, F. ..	Corack L. B.
453	Glenlivet ..	4	,, ..	McCluskey, H. ..	Strathmerton
38	Glyn Trustful ..	A	Pony ..	Roth Bros. ..	Ensay
401	Gobbler ..	A	Draught ..	Dunnett, G. ..	Stockyard Hill
217	Gold Brew ..	A	Thoro'bred	White, J. ..	Devon Park, Dunkeld
433	Golden Hue ..	A	Light ..	Bridgeman, T., junr.	Alvie
67	Graculus ..	A	Thoro'bred	Loveridge, S. ..	Corowa
39	Grampian Lad ..	A	Draught ..	Richards, A. & Son	Gymbowen
161	Gypsy Hero ..	A	,, ..	Downs, W. R. ..	Kotupna
230	Hampton Ben ..	A	,, ..	Seelander, P. ..	Warracknabeal
40	Harvest King ..	A	Thoro'bred	Nixon, P. C. ..	Orbost

STALLION REGISTER, 1927-28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
41	Heir Apparent ..	A	Thoro'bred	Defence Dept. ..	Melbourne
216	High Degree ..	A	Draught ..	Blight, J. T. ..	Cowangie
100	,, Honor ..	A	,, ..	Feldtmann, C. H.	Major Plains
289	Hillhead Knight ..	A	,, ..	Krause, R. E. ..	Kinimakatka
141	Invermay ..	A	,, ..	Hayward, S. G.	North Wangaratta
290	Invincible ..	A	,, ..	Tuckett, R. J. ..	Nathalia
23	Ironsides ..	A	Thoro'bred	Hore, M. ..	Talgarno
102	Jack	A	Draught ..	Fanning, W. ..	Wyuna East
352	,, Craig ..	4	,, ..	Shields & Oxley	Eddington
210	,, Marsh ..	A	Thoro'bred	McDonald, J. F.	Bacchus Marsh
356	Jacko	5	Draught ..	Schnaars, B. F...	Netherby
104	James Osterley ..	A	Light ..	Hnddleston, A. ..	32 Gheringhap-st., South Geelong
387	Jimmie Mac ..	5	Draught ..	McDougall, H. P.	Bundalong
414	Jimmy Lea ..	A	Light ..	Bradshaw, W., senr.	Springlea, Skipton
42	Jock Cedric ..	A	Draught ..	Gardner, J. W. ..	Cavendish
54	,, McGregor ..	6	,, ..	Reseigh & Flockhart	Culgoa
231	Justice	A	,, ..	Executors of Sir R. Clarke	Bolindo Vale, Clarkefield
447	Kelso Ideal ..	4	,, ..	Starritt Bros. ..	Mooroopna
2	Kelvin	A	,, ..	McKinnon, D. ..	Beazley's Bridge
274	Kerrston ..	A	,, ..	Carroll, E. ..	Corowa, N.S.W.
162	Khartoum ..	6	,, ..	Munro, D. ..	Casterton
180	Killawney ..	A	,, ..	Neville, E. ..	Marnoo
171	King Albert ..	A	,, ..	McKay, T. ..	Malmsbury
55	,, Ballance ..	A	,, ..	Kennett, J. H. ..	Kaniva
56	,, Bruce ..	A	Pony ..	Pearce, J. ..	Wodonga
320	,, Douglas ..	4	Draught ..	Hibbins, H. W...	Springfield Station, via Berriwillock
84	,, Jimmy ..	6	Pony ..	Dunn, R. N. ..	Sherriff-st., Stawell
232	,, John ..	A	Draught ..	Cail, A. ..	Kamarooka
13	,, of the Kings	A	,, ..	McKindley, W. C.	Marong
466	,, ,, Shepherds	A	,, ..	Hughes, J. ..	Yaapeet
57	King's First ..	6	,, ..	Jolly, C. A. ..	Woomelang
259	,, Prize ..	6	,, ..	Cuthbert, D. ..	Weerite
291	,, Treasure ..	A	Thoro'bred	G. Ritchie ..	Delatite, Mansfield
215	Kitchener ..	A	Draught ..	Oldham & White	Devon Park, Dunkeld
197	Korongah Craigwillie	3	,, ..	Davison, J. ..	Donald P.B.
142	Laird Again ..	A	,, ..	Fawcett, C. ..	Towaninnie
143	Lancashire Lad ..	A	,, ..	Robinson, W. ..	Armstrong
233	Langdale ..	A	,, ..	Donnellan, M. ..	Jeffcott North
85	Lee Creek Squire	A	,, ..	McConachy, Mrs. H.	Winchelsea
391	Leonard Dale ..	5	,, ..	Wilkie, J. T. ..	Leonard's Hill
181	Leo's Pride ..	A	Pony ..	Small, Miss G. ..	Spring Vale-road, Notting Hill
118	Little Comet ..	A	,, ..	McNally, T. ..	Seymour
60	,, Eumarrah..	A	,, ..	Painter, R. ..	Leaghur
234	,, Welshman	A	,, ..	Cameron, J. ..	Timor West
330	,, Wonder 3rd	A	,, ..	Ridd, N. J. ..	Glen Dove, Molesworth

Stallion Register, 1927-28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
86	Lochaber ..	A	Light ..	Watson, H. ..	Ross Creek, via Smythesdale
35	Lord Aldie ..	A	Draught ..	Machieson, S. E.	Buchan
182	,, Armadale ..	A	,, ..	Lee, H. ..	Clunes
43	,, Cedric ..	A	,, ..	Lehmann, F. A.	Lismore
119	,, Everest ..	A	,, ..	Hore, T. ..	Leitchville
58	,, Jellicoe ..	A	,, ..	McMahon Bros...	Merrinee
59	,, Northcote ..	A	,, ..	Hicks, W. ..	Pleasant Hills, Miriam
183	,, Plunton ..	A	,, ..	Runciman, M. & J.	Swan Hill
331	,, Ronald ..	A	,, ..	Leathart, H. H.	Middle-road, South Camberwell
105	,, Wallace ..	A	,, ..	Smith, C. ..	Dumosa
339	,, Welkin ..	A	Thoro'bred	Carmichael, D. ..	Swan Hill
87	Lucky Boy ..	6	Draught ..	Graham Bros. ..	McKenzie's Flat, Bacchus Marsh
163	,, Jim ..	A	,, ..	Morris, J. ..	Woolsthorpe
236	Lu Lu's Dandy ..	A	Pony ..	Executors late Sir R. Clarke	Clarkefield
292	Lue Ribbons ..	A	Light ..	Williams Bros. ..	Ross Creek
61	Lym Truffle 2nd..	A	Draught ..	Wallis, J. C. ..	Miram
366	Lyndale ..	5	,, ..	Arnold, A. ..	Werrigar East
62	McAgain ..	A	,, ..	Pilgrim, H. E. ..	Winiam
115	Mac	6	Pony ..	Cameron, A. ..	Warracknabeal
14	Macedon Hero ..	A	Draught ..	Evans, B. ..	Woodfield
269	Magician ..	A	,, ..	Adkins, T. ..	Korumburra
15	Major Albert ..	A	,, ..	Doherty, J. P. ..	Rochester
410	,, Douglas ..	A	,, ..	Scott, J. W. ..	Dimboola
326	,, Mac ..	3	,, ..	Henderson, H. ..	Barraport
106	,, Willie ..	6	,, ..	Alexander, A. S.	Diapur
359	Mallee Picture ..	5	Light ..	Rowney, F. C. ..	Turriff, W.
262	Maori Chief ..	A	,, ..	Caldow, J. ..	Winchelsea
237	Marcus	A	,, ..	Reid, Miss B. ..	Blossom Park, Bundoora
164	Marcus Junior ..	A	,, ..	Blair Bros. ..	Lara
436	Mark Hazel ..	A	Pony ..	Seymour, G. C. ..	Gundowring
350	Mark Twain (late Pride)	4	Draught ..	Wharton, H. ..	Manangatang
63	Marquis Bold ..	A	,, ..	Birthisel, G. ..	Wehla
416	Master Brigham ..	A	Pony ..	Kiely, P. ..	Edi Upper
388	,, Brook ..	4	Light ..	Beattie, A. ..	Tungamah
317	Masterdale ..	3	Draught ..	Kerr, T. F. ..	Koroop
88	Master Wattee ..	A	,, ..	Brock Bros. ..	Moe
319	Meredin ..	5	,, ..	Roberts, W. G. ..	Kerang P. B.
342	Merry Oliver ..	A	Thoro'bred	Hassett, T. ..	Caramut
415	Metal Bells ..	A	Light ..	Lee, J. ..	Invergordon
402	Midday	A	Pony ..	Bannam, J. ..	Wallacedale
44	Middlerigg Referee	A	Draught ..	Lindner, C. ..	Murtoa
211	Mikado	6	Thoro'bred	Turnbull, A. G...	Winnieburn North, Coleraine
45	Moira Lad ..	A	Draught ..	Cunnington, C. R.	Bamawn Extension
159	Mont Harold ..	A	Light ..	Curtiss, W. ..	Glen Waverley
89	Moredun Baron ..	A	Draught ..	Tilley, F. ..	Port Fairy
90	,, Ranger..	A	,, ..	Mitchell, J. R. ..	Sandford
238	Morocco Chief ..	6	,, ..	Arnold, A. ..	Werrigar East
426	,, Lad ..	A	,, ..	Parish, Mrs. E. ..	Horsham
383	Mossdale Defiance	4	,, ..	Meyer, J. ..	Kaniva

Stallion Register, 1927-28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs			
24	Napoleon ..	A	Draught ..	Lewis, S. J. ..	Maldon P.B.
64	Native King ..	6	,, ..	Murdock, K. ..	Goroke, Langi Logan
279	Newfield's Pride ..	A	,, ..	Martin, J. M. ..	Aubrey-road
430	Newton Banks ..	A	,, ..	Shaw, O. ..	Wooriwyrite, via Terang
65	,, Stewart..	A	,, ..	Borgelt, A. H. ..	Nhill
403	,, Style ..	A	,, ..	Currell Bros. ..	Cowley's Creek
314	Newton's Moddle	4	,, ..	McClay, C. W. ..	Barraport, via Boort
411	Noble Glen ..	A	,, ..	Nagorcka, W. ..	Tarrington
66	Non Pariel ..	A	,, ..	Roberts, J. ..	Calder's Bag, via Lake Rowan
278	Nyallo Prince ..	A	Light ..	McAlpine, W. T.	Hopetoun East
446	Odd Pictures ..	5	,, ..	McAlpine, E. ..	Toolamba P.O.
392	Onword Baron Belmont	4	Draught ..	Ferguson Bros. ..	Murmungee
449	Onward Kennedy	3	,, ..	Thompson, W. L.	Karramomus
107	Oscar Siam ..	6	Light ..	Fehring, H. ..	Cohnna
374	Overslade ..	3	Draught ..	Rodda, C. S. ..	Warracknabeal
303	Pat Letty ..	4	,, ..	Shepherd, J. ..	Ouyen
173	,, of Transy ..	A	Pony ..	Maclean, Mrs. D.	Irving-road, Toorak
6	Patrician ..	A	Draught ..	Gibbins, W. ..	Galah
372	,, Craig ..	3	,, ..	Jackson, G. ..	Laen North
91	Pearlyn ..	A	Light ..	Bowden, F. W. ..	Won Wron
184	Periscope ..	A	,, ..	Ervin, J. & M. ..	Pyramid
198	Playfair ..	4	Draught ..	Wright, W. ..	St. Arnaud East
239	Poilu	A	Pony ..	Cross Bros. ..	Goroke
241	Predominate ..	A	Light ..	Kelly, C. & C. ..	Barwidgee, Caramut
437	Pride of the Lake	4	Thoro'bred	Blake, R. F. ..	Green Lake
165	,, ,, South	A	Draught ..	Hill, H. G. ..	Nurrabil
92	Prince Bucklyvie..	6	,, ..	Pennell, G. W. ..	cr. New and Cole streets, Elsternwick
345	,, Charming ..	4	,, ..	Allan, P. ..	Thalia, via Wycheproof
120	,, Coupar ..	A	,, ..	Henderson, J. ..	Leongatha South
88	,, Douglas ..	A	Light ..	Martin, P. ..	Molesworth
263	,, Maurice ..	A	,, ..	Morrissey, O. V.	Molesworth
108	,, Que ..	A	Pony ..	Nicol, Mrs. L. ..	Heatherton, Dandenong
400	Princeroy ..	3	Draught ..	Baker, F. H. ..	Jung
390	Prince William ..	4	,, ..	Stokes, S. ..	30 Islington-street, Collingwood
242	Quality	A	Pony ..	Callow, A. E. ..	520 Mair-street, Ballarat
243	Quatta's Belmont	A	Draught ..	Lindsay, W. ..	Baranduda
264	Reality II. ..	A	Pony ..	Horswood, W. ..	Emerald
174	Red King ..	A	Light ..	Matthews, A. ..	Benambra
276	,, Lion ..	A	Pony ..	Whitehead, G. ..	Minhamite
297	Regis	A	Draught ..	Manifold, E. ..	Wiridgil, Camperdown
121	Review	A	,, ..	Donnan, J. ..	Watchupga
46	Ribbon Bells ..	A	Light ..	Gilbert, H. ..	Koriella
47	Rising Star ..	A	Draught ..	Hood, J. W. ..	Polkemmet P.O.
325	,, Sun ..	5	,, ..	O'Bree, J. ..	"Bower Bank," Piangil
196	River Beils ..	A	Light ..	Doran, T. ..	Bennison
109	Robinhood ..	6	Draught ..	Gaylor, W. ..	Nullawil

STALLION REGISTER, 1927–28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
122	Rocket	A	Pony ..	Thomson, A. W.	Monivar, Hamilton
3	Rose of Rexworth's Pride	3	Draught ..	Lang, Jno. ..	Bangerang
387	Rosedale ..	5	,, ..	Liesfield, C. J. ..	Rainbow
103	,, ..	6	,, ..	Müller, P. H. ..	Box 88, Dimboola
277	Royal	6	,, ..	May, Jos. ..	Joel Joel, via Stawell
8	,, Ben ..	A	,, ..	Hamilton, J. M.	Inverleigh
244	,, Brigham ..	A	Pony ..	Hinkley, E. & Sons	Beeac
245	,, Bute ..	A	Draught ..	Luckie, G. ..	Springhurst
399	,, Dale ..	4	,, ..	Executors late J. C. Dufty	Lorquon
123	,, Douglas ..	A	,, ..	Dugdale, Jno. ..	Myrniong
172	,, Duke ..	A	,, ..	Executors late C. W. Dennert	Hamilton
212	,, Escort ..	A	,, ..	Griffiths, T. A. ..	Mile Creek, Glenrowan
185	,, Fashion ..	A	,, ..	Shaw, F. ..	Wycheproof
186	,, Flush ..	A	,, ..	Colton, W. ..	Kerang
365	,, Gartley II.	5	,, ..	Sleep, S. ..	Box 132, Warracknabeal
265	,, Garvin ..	A	,, ..	Brown, G. F. ..	c/o A. E. Bratley, Moorabool-street, South Geelong
296	,, Mac ..	A	Light ..	Charity Bros. ..	Serpentine
382	,, Northcote..	4	Draught ..	Hicks, Jno. ..	Kaniva
240	,, Robin ..	A	,, ..	Boyle, J. ..	Verdant Vale, via Boort
378	,, Scotch ..	4	,, ..	Smith, R. H. ..	Willenabrina
280	,, Shepherd ..	A	,, ..	Heard, T. A. ..	Noradjuha
25	,, Simon ..	A	,, ..	Cox, A. E. ..	Alma, via Maryborough
116	,, Success ..	A	,, ..	Elsom, W. ..	Dart Dart
462	Royalty ..	A	Pony ..	Coe, W. ..	Coleraine
327	Royal Viceroy ..	5	Draught ..	Buchanan, G. ..	Box 62, Boort
100	,, ,, ..	6	,, ..	Bellville, J. ..	Watchem
213	Rufus	A	,, ..	Kent, Mrs. S. E.	P.B., Sheep Hills
124	Safe Voyage ..	A	Light ..	Meyers, V. ..	Lockwood
349	Salvation ..	4	Draught ..	Purves, P. B. ..	Noonameena, Tol Tol, Mallee
160	Sam Huon ..	A	Light ..	O'Brien, J. P. ..	110 Powlett-street, East Melbourne
26	Sandy's Fashion ..	A	Draught ..	Timms, M. N. ..	Minyip
166	Santa Claus ..	A	Pony ..	Greaves, W. C. ..	Monomeith
362	School Bells ..	5	,, ..	Newitt, J. ..	Sheep Hills
187	Scotch Laddie ..	6	Draught ..	Christenson, H. F.	Tyers
353	,, Crown ..	3	,, ..	O'Bree, J. ..	Swan Hill
301	,, Mixture ..	5	,, ..	Mitchell, W. ..	Woomelang
95	,, Thistle ..	6	,, ..	Bagnell, J. ..	Mologa
412	Scotchie ..	6	,, ..	Broom, A. ..	Eastville, via Maldon
111	Scotland Again ..	6	,, ..	Witherow, T. J.	Wangaratta South
380	,, Forever..	3	,, ..	Rogers, S. ..	Box 26, Rainbow
398	Scotland's Dignity	4	,, ..	Bodey, D. L. ..	Jung
125	,, Viceroy	A	,, ..	Parker, T. ..	Pepper's Plains
167	,, Victory	A	,, ..	Peucker, A. ..	Sea Lake

Stallion Register, 1927–28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs			
335	Scottish Banker ..	A	Draught ..	Byrne, G. L. ..	Kewell North
393	,, Chief ..	5	,, ..	Bourke, J. ..	Edi
440	,, King ..	5	,, ..	Hamilton, A. L.	Corryong
428	,, Laird ..	A	,, ..	Parish, W. ..	Horsham
126	,, Prince ..	A	,, ..	Buckley, R. D. ..	Glenlea, via Gerang
27	Scotty	A	,, ..	Roulston, J. ..	Muskerry East
93	Selection ..	A	,, ..	Watson, C. ..	Milndale, via Glen Forbes
48	Shepherd Again ..	A	,, ..	Lindner, C. ..	Murtoa
439	,, King ..	5	,, ..	Gilchrist, T. ..	Rutherglen
246	Sherriff Huon ..	A	Light ..	Allender, T. ..	Mount Cole Creek, via Ararat
188	Siam	A	,, ..	Glenn, J. ..	Tylden
460	Silver King ..	A	,, ..	Nulty, J. J. ..	Walpeup
214	Sir Bute ..	A	Draught ..	Thomson, J. M.	Stratford
434	,, Dillon ..	6	Light ..	Lesser, C. A. ..	Coleraine
266	,, Everest ..	A	Draught ..	Ralston, A. ..	Lucknow
275	,, Regulus ..	A	,, ..	Ellwood Bros. ..	Wallace
112	,, Rupert ..	A	,, ..	Kelly, G. ..	c/o Mailman, Rochester
355	,, Walter ..	4	,, ..	Elsom, W. ..	Dart Dart
343	,, Walter Burnside	A	,, ..	Schroeder, F. ..	Caringa
247	,, Wilfred ..	A	,, ..	Chisholm, A. G.	St. Arnaud
389	Soldier Boy of Fenwick	3	Pony ..	Maclean, Mrs. D.	Yan Yean
347	Some Style ..	A	Light ..	Pilicas, P. ..	112 Wellington-st., Collingwood
413	Southern Lad ..	A	Draught ..	McKenzie, G. ..	Pullut
267	,, Star ..	A	,, ..	Maher, J. ..	Nyrraby, via Chillingollah
340	Springbank Lawrence	A	,, ..	Crawford, W. H.	Hamilton
427	St. Simon ..	A	,, ..	Butler, G. J. ..	Carisbrook
404	Stylish Bells ..	A	Light ..	Sterritt, Mrs. C...	1005 South-street, Ballarat
454	,, Kennedy..	3	Draught ..	Phillips, J. M. ..	Conjupna-road
170	Sudbourne's Chief	6	,, ..	Stray, G. H. ..	Tabilk
417	Sunbeam ..	A	Thoro'bred	Treasure, H. L...	Castleburn, Stratford
456	,, ..	A	Draught ..	Wilson Bros. ..	Cohuna
168	Sunbury ..	A	Light ..	Nolan, T. C. ..	Carinya, Tarrawingie
323	Surprise Journey..	4	,, ..	McDonald, J. ..	Ultima
189	Sweet Marillo ..	A	Thoro'bred	Parslow, E. T. ..	Omeo
248	Tax Payer ..	A	Pony ..	King, V. ..	Scott's Creek
302	Tennesse Direct ..	5	Light ..	Matchett, R. ..	Mitchell-street, Bendigo
113	The Banker ..	A	Draught ..	Templeton, A. ..	Coleraine
396	,, Cavalier ..	4	,, ..	Koch, L. G. ..	Pine Lodge
10	,, Colonel ..	A	,, ..	McDonald Bros.	Mortlake
127	,, Crown ..	A	,, ..	Altman, E. A. ..	Pullut
341	,, Dux ..	6	,, ..	Hargreaves, Jno.	Dederang
154	,, Joker ..	A	Pony ..	Chambers, D. ..	Mologa
199	Thornfield Craig ..	4	Draught ..	Leeder, E. J. ..	Cope Cope
94	Timely Direct ..	A	Light ..	Cromie, J. M. ..	Gray-street, Swan Hill
128	Toby	A	Pony ..	Thompson, A. W.	Monivar, Hamilton
463	Top Score ..	6	Draught ..	Irvine, T. W. ..	Yarra Glen
298	Tracey Voyage ..	A	Light ..	Mackin Bros. ..	Korong Vale

Stallion Register, 1927–28—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
145	Trafalgar ..	A	Thoro'bred	Executors late W. Mitchell	Towong Hill, Corryong
129	Trelawney Time ..	A	Draught ..	Larcombe, R. H.	Clifford, E., Mount Moriac
49	Trelawney's Pride	6	,, ..	Nairn, J. ..	Box 44, Ouyen
114	Tremenheere Craig	6	,, ..	Davies, C. N. ..	Rochester W.
328	True Scotch ..	3	,, ..	Sutton, F. ..	Gredgwin
5	Valiant	A	Thoro'bred	Shillabeer, F. ..	c/o E. Fisher, Flemington
430	Vice Regal ..	A	Draught ..	Parish, W. G. ..	c/o Wilson and Bolton, Horsham
293	Vin Direct ..	A	Light ..	Mulfahey, J. D...	96 Lewisham-road, Windsor
130	Waironga's Model	6	Draught ..	Yetman, J. ..	Patchewollock
95	Waituna ..	A	,, ..	Greaves, S. A. ..	Narre Warren
431	Wakapero ..	A	,, ..	Ladson, G. R. ..	Mincha
200	Wallace Dale ..	5	,, ..	Dixon, W. J. ..	Donald
131	Welsh Flyer ..	A	Light ..	Reid, P. J. ..	Milawa
452	Widgiewa Alick ..	4	Draught ..	Jackson Bros. ..	Pirree P.O., via Waaia
132	,, Belmont	A	,, ..	Perkins, C. H. ..	Rainbow
28	,, Chief ..	A	,, ..	Lynn, S. J. ..	Orbost
309	,, Digger	3	,, ..	Menzel, J. W. ..	Cowangie
29	,, Edward	A	,, ..	Down, W. G. ..	Koonda, via Violet Town
1	,, Fingal..	5	,, ..	Dart, F. J. ..	Lah
313	,, Mark ..	4	,, ..	Ladson, G. R. ..	Mincha West
190	,, Marshall	A	,, ..	Henderson, Jno.	Baulkamaugh North
441	,, Norseman	4	,, ..	Wilkinson & Young	Yarrawonga
206	,, Sapper	A	,, ..	Allen, G. C. ..	Broughton, via Nhill
155	,, Stephen	6	,, ..	Hewitt, C., & Sons	Werrigar East, Warracknabeal
117	William Sportsman	A	,, ..	Dehnert, W. A...	Ballan
354	Willie Belmont ..	3	,, ..	Allen, J. S. P. ..	Broughton, via Nhill
348	,, Craig of Highbury	3	,, ..	Kerr, T. ..	Thalia
457	,, McBride ..	4	,, ..	Moroney, T. ..	Barnedown
406	Windlesham ..	A	Thoro'bred	Hillman, W. T...	Queen-street, Bendigo
30	Winning Hit ..	6	Draught ..	Hargreaves, J. ..	Eskdale
205	Winsome Chief ..	A	,, ..	Petersen, C. R. ..	Kellalac
204	Worthy Mac ..	A	,, ..	Elliot, J. ..	Cooma
249	Young Baron Bold	6	,, ..	Gervasone, N. ..	Doveton-street, North Ballarat
31	,, Clydeside	A	,, ..	Jager, H. ..	Box 43, Swan Hill
270	,, Comet ..	A	Pony ..	Adkin, T. ..	Greyacres, Korumburra
50	,, Coronation	A	Draught ..	Bennett, W. J. ..	Cannie
283	,, Dan ..	A	,, ..	Haggbloom, J. V.	Sea Lake
310	,, Dunsdy Victor	5	,, ..	Walker, E. A. ..	Cowangie
51	,, Emulator..	A	Pony ..	Defence Dept. ..	Melbourne
268	,, Flashlight	A	Draught ..	Rawson, T. ..	Omeo
311	,, Sapper ..	4	,, ..	White, H. ..	Cowangie
451	,, Scotchman	5	,, ..	Buckle, G. ..	Rochester
133	,, Shepherd ..	A	,, ..	Chapman, G. ..	Minyip
178	,, Starling ..	A	Light ..	Regan, W. ..	6 Montgomerie-st., Moonee Ponds

WHAT A FLOWER IS.

So different are the brightly-hued flowers from foliage leaves that it may seem difficult to credit the statement that the flower is in reality only a leaf shoot which has been modified to carry out the special duties of reproduction. It was the poet Goethe who first recognized that petals, sepals, stamens, and the parts of the ovary all originated as leaves, and pointed out how all these structures, apparently so different in every respect, resemble foliage parts in their early stages in the bud.

If a leafy shoot be examined, it will be seen that each leaf, or pair of leaves, is separated from those above and below it by a length of wood. As the tip of the shoot is approached the leaves become nearer together, until at the extremity we find a number of small young ones, apparently all arising from the same point. In the flower the spaces between the leaves have been suppressed, and the outer ring of sepals represent the lower series, the petals the next, then the stamens and the parts of the pistil the terminal series.

However difficult it may be to see in the glorious floral products of our gardens but a mass of modified leaves, there is no doubt that this is what they really are, and evidence of the truth of this statement is offered in plenty by the flowers themselves. The white water lily is one of the most useful for the purpose of showing how leaves may have been transformed into floral parts in easy stages. If a bloom of this plant be pulled to pieces and the portions systematically arranged, it will be seen that the passage from the green leaf-like sepals on the outer ring to the yellow stamens in the centre is a very gradual one, all kinds of intermediate stages being marked. In many instances it is impossible to decide whether a particular part should be counted as a petal or as a stamen, or as a sepal or a petal, for some of the characters of each are shown.

Again, if a very large number of garden flowers are carefully examined, a few are almost sure to show a reversion in some of their parts to ordinary foliage leaves. In primulas some of the sepals may assume the form of the leaves characteristic of the stem, while the small, pea-like flowers of the clover will occasionally change into three-lobed leaves. Many flowers show a few stamens in which the ordinary thread-like filament is wholly or partly changed into a pistil; while it is by no means uncommon for certain varieties of garden roses to produce blooms in which the petals in the centre show the green colour and shape of leaves.

The double cherry may be cited as a further proof of the truth of the theory that traces the origin of the flower to a modification of normal leaves. When a bloom of this kind is pulled to pieces, after the petals have been removed it will be found that the centre is occupied by two folded green leaves, in the place where the ovary should be. Further, as the petals are plucked off, every gradation may be traced from those showing the ordinary shape and character of these parts, through what appear to be half-stamens to normal stamens, which in turn give place to green, leaf-like bodies, which might be either partially developed stamens or leaves.

All so-called "double" flowers are likely to show similar half-structures, for the vast majority of them have been raised artificially and have assumed their double character as a result of some of their stamens having been transformed into additional petals. Thus the centres of many old roses will be found to contain malformed petals, bearing partly developed anthers at their ends, or stamens with filaments expanded into irregular-shaped petals. From the foregoing it may be agreed then that, without going outside the garden, it can be shown that leaves may change into sepals, sepals into petals, and these into stamens; but what of the ovary. How shall we understand how this apparently highly-organized part has arisen from a leaf. The common culinary pea will enable us to do this without very much difficulty.

The ripened ovary of the pea becomes the pod, with the seeds, or "peas," contained within it. If this be opened and laid out flat, it will be found to consist of two equal halves divided down the middle by a thickened rib. The peas are attached to each half along the margin. Place a leaf of the pea by the side of the opened pod; it will at once become evident that, by folding the leaf in half along the mid-rib, an object very similar to the pod is produced, and it requires very little prompting to reveal the pod as a seed-bearing leaf folded in half, and with the free margins joined together.

If the ripened ovary of the garden stock be cut through transversely, it will be found to possess two chambers, in each of which seeds occur. This may be likened to two pea pods placed side by side, with their broad surfaces in contact, except that in the stock the two pods have grown together. Similarly, the violet has three compartments to its ovary, formed in the same way, while the other plants have much larger numbers. The leaves which have been modified into seed-bearing bodies are called carpels, and, as has been shown, an ovary may be made up of one or a number of these.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Cultivation.

Orchard ploughing should now be finished, and the main work for the next few months will be an endeavour to keep the soil surface loose, friable, and well opened. The consolidation of the surfaces must be avoided, as a hard, compact surface means the loss of much soil moisture, by capillary attraction. So that after rains, heavy dews, the spray pump and other traffic, it will be as well to run the harrows over the surface of the soil, so as to keep the surface well broken and to maintain a good earth mulch. If the harrows are not sufficient to break the clods, a spiked or heavy roller should be drawn over it, and then harrowed. If the weather is at all dry it is advisable to plough only as much as may be harrowed in the same day. By immediately following up the ploughing with harrowing a minimum amount of moisture is lost by capillarity.

Green manure crops should now be ploughed under, and should they be very abundant in growth, a roller should be run over them and ploughed with a coulter attached. Any of these means will serve to get the crop underground, which is a desideratum.

In addition to the retention of soil moisture, cultivation of the orchards will suppress the weeds which rob the trees of food and moisture. The suppression of weeds is an important work in the spring and summer, and they should be rigorously hoed or cultivated out.

Spraying.

Spraying for all pests and diseases is, at this time of the year, an important work in the orchard. Bordeaux or lime sulphur spraying for the black spot of apples and pears, for scab and shothole in peaches and apricots, for the leaf curl of the peach and rust of the plums and peaches. should now be completed.

Where there are indications that previous sprayings have not been thoroughly successful, a weak lime sulphur spray should be given.

Wherever they are present, nicotine sprays should be given to combat the peach aphis, and the pear and cherry slug. For the latter pest, arsenate of lead should not be used if the cherries are within a month of ripening. Arsenate of lead is so tenacious, and thus it is likely to remain on the fruit until it is ripe, when it would be dangerous to the consumer. Thus, while this property of remaining on the fruit for a considerable time is of great value in the Codlin Moth spraying, it is quite of the opposite value when used for the pear and cherry slug. Either tobacco water or hellebore is useful for the eradication of this pest, as these substances do not remain long on the trees, and they are quite as effective as arsenate of lead. Even a dry dusting with lime or with ordinary soil will keep the slugs in check.

For cherry aphis, the trees should be sprayed at once with nicotine-sulphate.

Codlin moth spraying, too, will be in evidence this month. It is generally assumed that the appearance of the moth is coincident with the bursting of the flowers. This is not always so—the moths frequently come slightly later than the blooming period. Owing to the rapid expansion of the fruit, it is well to follow the first spraying with a second in a week or ten days' time. Arsenate of lead is still the spray for the Codlin moth, nothing having been found to supersede it.

Arsenate of lead may be mixed with nicotine sprays, or with Bordeaux mixture, without any detriment to either spray, if necessary.

The Vegetable Garden.

A good tilth, and a well-pulverized soil, are the main soil necessities in the vegetable garden this month. Frequent cultivations will keep in the soil moisture, and will obviate the necessity for surface waterings. At the same time, it should be remembered that the vegetable garden requires more water than the flower garden, owing to the quick growth of the plants. Quickly-grown vegetables are more tender and more

luscious than slowly-grown ones: thus a good water supply will need to be maintained. Weeds are great moisture-robbers, and they should be kept out of the vegetable garden at this time of the year.

Late plantings of tomatoes may now be carried out; all early-planted plants should be fed, staked, and the laterals pinched back. A little bone-dust or superphosphate may be given, but these are not equal to animal manures, if the latter are available. Chemical manures should only be given in limited quantities, 6 or 7 cwt. per acre would be a heavy dressing, and this works out at nearly 3 ozs. per square yard. Vegetable growers may easily try this for themselves, and it will soon be seen that 3 ozs. scattered over a square yard of surface will appear to be a very light dressing.

French beans, carrot, parsnip, celery, radish, peas, and turnip seeds may now be sown. Seeds of cucumber, melon, and pumpkin family may now be sown in the open ground. All seedlings may be transplanted on favorable days, and it will be well to sprinkle the tops as well as to water the roots.

Asparagus beds may be top-dressed with manure, and kept well weeded. Such weak growths that are not gathered for eating should be cut out of the beds.

REMINDERS FOR NOVEMBER.

LIVE STOCK.

Horses.—Continue to feed stable horses well; add a ration of greenstuff. Rug at night. Continue hay or straw, chaffed or whole, to grass-fed horses. Feed old and badly-conditioned horses liberally. If too fat, mares due to foal should be put on poorer pasture. Turn out workers due for a spell at grass. In view of sand trouble this year horses which have been paddocked all the winter should not be put to work until properly conditioned and any sand accumulation got rid of. A course of three or four bran mashes, after a twelve hours' fast, followed by 1 to 1½ pints of linseed oil, is helpful. Repeat in two or three days, if necessary. Colts to be gelded should be operated on before hot weather sets in.

Cattle.—Except on rare occasions, rugs may now be used on cows at night only. Continue giving hay or straw, if possible, to counteract the effect of green grass. Be prepared for milk fever. Read article in *Journal of Agriculture*, November, 1923, page 659. Give calves a dry shed and a good grass run. Continue giving milk at blood heat to calves. Be careful to keep utensils clean, or diarrhœa will result. Do not give too much milk at a time for the same reason. Feed regularly with regard to quantity and time. Give a cup of limewater in the milk to each calf, also place crushed oats or lucerne hay in a trough so that they can eat at will. Provide salt-lick consisting of 20 lbs. bone meal or rock phosphate, 20 lbs. slacked lime, 20 lbs. salt, and ½ lb. sulphate of iron.

Pigs.—Supply plenty of bedding in well-ventilated styes. Keep styes clean and dry, and feeding troughs clean and wholesome. Sows may now be turned into grass run. Sows suckling young should be well fed to enable them to produce plenty of milk. Give young pigs pollard and skim milk in separate

trough as soon as they will take it, and keep them fattening from the start to get them off as early as possible. Give a tablespoonful of bone meal, or half that amount of mineral phosphate per 100 lbs. live weight in food daily. Give plenty of charcoal. If pigs are lousy, dress them with kerosene emulsion or sulphur and lard, rubbing well into crevices of skin, and disinfect styes. Pig breeding and feeding should be very profitable for a long time to come, and it should be safe to launch out now.

Sheep.—Prepare for dipping. Ascertain exact contents of bath before mixing.

The worried existence led by sheep which are constantly tormented by ticks and lice reacts on and seriously depreciates the quality of the wool and the condition of the sheep, and especially of lambs. If sheep are found to be ticky or lousy they should be dipped immediately, so as to relieve without delay the irritation caused by vermin. In cases where lice are very bad it will be necessary to dip young sheep twice to free them from the pest. Irritation soon causes the sheep to become restless and to scratch against posts and logs, thereby making them fall in condition and causing loss by the tearing of their fleece. Dipping, if the proper materials are used, and the work is properly carried out, is one of the most valuable investments that any owner of sheep can make. It gives returns which more than compensate for the trouble and expense incurred. When a sheep-owner becomes accustomed to using a certain dip as effectively as he should, it is then that he appreciates the results most.

Dipping does not make the wool grow where none grew before, but it keeps the skin healthy, and so enables it to grow a healthy wool. If a sheep's life be spent in feeding and sleeping, it will naturally grow a better fleece than if it has to spend time in scratching and biting, and thus losing part of the wool it has already grown. An important factor in some dipping is to keep the liquid in the dip in motion by constant stirring, as, if it is allowed to settle, the light insoluble matter floats on the top of the water, and may be the means of poisoning sheep if taken by them when passing through the dip. Valuable sheep have been poisoned in this way. Whatever brand of dip is used, the instructions accompanying it should be faithfully followed.

Lambs should not be put through the dip when thirsty, as they may drink as they swim through. For the same reason they should be kept away from any small pools in the vicinity of the exit from the draining pens. Sheep just dipped should not be put on to grass before they have dried, as the drip of the bath on the grass may cause poisoning.

Never allow the rams to join the ewes after dipping until the ewes have dried, and the same applies to the lambs and their mothers. Never hurry sheep through a dip; some cannot swim as fast as others; give them plenty of time, they can swim a fair distance in one minute, which after all is not long to wait. Their heads should be pushed under two or three times, but on no account held under. Care must be taken to see that the animal is thoroughly saturated to the very skin. Remember that the dip has to contend against the greasy nature of the fleece and skin and must be allowed time to do this. So many dipping operations fail on account of insufficient immersion, often due to the hardness of the water. Always be careful to dip every sheep, because a few undipped infested ones may reinfest the dipped sheep. It is important that sheep in the one district should be dipped about the same time, so as to avoid chances of reinfestation.

Poultry.—Provide plenty of green food and shade. Watch for vermin; spray crevices of perches and houses with crude carbolic acid, 1 in 50. Keep water clean and cool, and out of the sun. One packet of Epsom salts should be given to thirty birds through the mash. Remove all male birds from the flock. Infertile eggs are preferable when pickling, or when placed in cool storage.

CULTIVATION.

Farm.—Plant main crop of potatoes. Cut hay and silage. Weed early potatoes. Sow maize and millets. Weed tobacco beds, and water, if dry.

Orchard.—Ploughing, harrowing, and cultivating to be continued. Weeds to be kept down. Secure, pinch, and spray grafts with water. Spray frequently for codlin moth, cherry aphis, pear and cherry slug, and peach aphis. Plant out citrus trees.

Vegetable Garden.—Hoe and mulch surface. Suppress weeds. Water where dry and hoe afterwards. Disbud and pinch back tomato plants. Sow French beans, peas, lettuce, cucumber, melon, &c., seeds.

Flower Garden.—Water and mulch. Cultivate and keep down weeds. Thin out weak wood from roses. Prune early all flowering shrubs that have finished flowering. Lift and store bulbs. Plant out chrysanthemums. Liquid-manure herbaceous perennials. Sulphur-dust for rose mildew.

VITICULTURE.

Vineyard.—Field grafts require careful attention in the way of removal of suckers and scion roots. (See Bulletin on "Spring Grafting," No. 38, page 29.) Keep a sharp look out for Black Spot and Downy Mildew; whether the latter disease is seen or not, finish spraying by 20th October. A preliminary spray when the bunches are most visible is strongly recommended. In irrigated vineyards make it a rule to *spray immediately before watering.* Information on Black Spot and Mildew will be posted on application. Cultural work, such as scarifying and hoeing, should be actively pushed forward, so as to provide as good a "mulch" as possible during summer. Proceed with tying up, stopping and topping. Avoid excessive topping; summer pruning is often more injurious than useful in warm, dry climates. Young vines especially need judicious handling. Disbudding and stopping, though not indispensable, are of great use to shape the vine. Early execution is imperative. *Better not disbud at all than disbud late.* Cincture Zante currant vines after flower caps have fallen. Apply second sulphuring just before blossoming, wherever Oidium was prevalent last year.

Cellar.—Taste all young wines; beware of dangerous symptoms in unfortified fruity wines, which may need treatment. Fill up regularly all unfortified wines

BEEKEEPING.

In most districts, October is the principal swarming month; in late localities, particularly at the higher elevations, most of the swarming takes place in November. Where a honey flow is expected from Redgum or Yellow Box during December and January, it is not wise to make a further increase in the number of colonies by allowing after-swarms to come off and hiving separately, as the parent stock would be too much depleted of bees, and there would not be sufficient time for it to recover, or for the swarms to build up, before the honey flow is on, and much of it would therefore be lost.

After-swarms can best be prevented by hiving the first or prime swarm on the old stand and moving the colony from which it came to a new stand, at the same time destroying all the queen cells in it except one—the most perfect and forward one.

If no increase at all is desired, the parent colony may be left alongside the old stand on which the swarm was hived, but with the entrance facing in a different direction. When the young queen in the swarmed stock is laying, which will be in about three weeks, the hive may be gradually turned round till it faces the same way as the swarm, and, after removing the old queen from the swarm, the two stocks may be re-united, thus making a very strong colony with a young laying queen, in the best condition for storing honey and very unlikely to swarm again the same season.

The uniting of the two stocks is best done towards evening, by first giving both a little smoke between the combs and then alternating them for the time being, so that each comb from the swarm is between two of the old combs, the object being to thoroughly mix the bees. Two or three days after, the combs can be sorted; the best should be selected for the brood chamber and the others put in the upper story. Uniting should not be attempted till after the young queen is laying, otherwise there will be much fighting.

In localities where the colonies have come through the Winter very strong, there is likely to be much swarming wherever Cape Weed or some other pollen-yielding plant is plentiful, the duration of blooming and of swarming depending, of course, upon the weather.

When several days of bad weather follow the hiving of swarms, it may be advisable to feed sugar syrup (one part sugar to one part water) to keep up comb-building and brood-rearing, so as to have the greatest number possible of field bees in the hive during the honey flow later on. Honey should never be used for feeding bees, unless it comes from an apiary which has been absolutely free from disease for at least two years.

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It comes early and can be fed off in from four to six weeks after seeding. Rich in milk-producing properties. Sow 15 lbs. per acre broadcast, or 8 to 10 lbs. in drills. **Extra Quality. Re-machine Cleaned Seed. 3d.** lb.; **25/-** per cwt.

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Exceedingly useful forage plant, yielding a large amount of green feed. Its highly nutritious and saccharine qualities recommend its culture. Sow 14 lbs. per acre broadcast, or 7 lbs. in drills. **7d.** lb.; **60/-** cwt.

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Sweet and palatable. Excellent for dairy cows, and a fine cleaning crop. Sow 7 lbs. per acre in drills, or 15 to 25 lbs. broadcast. **6d.** lb.; **50/-** cwt.

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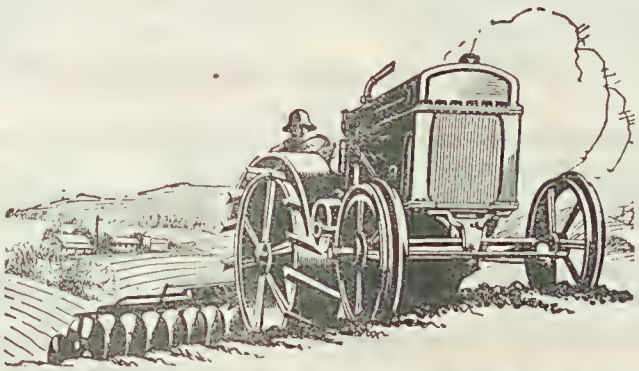

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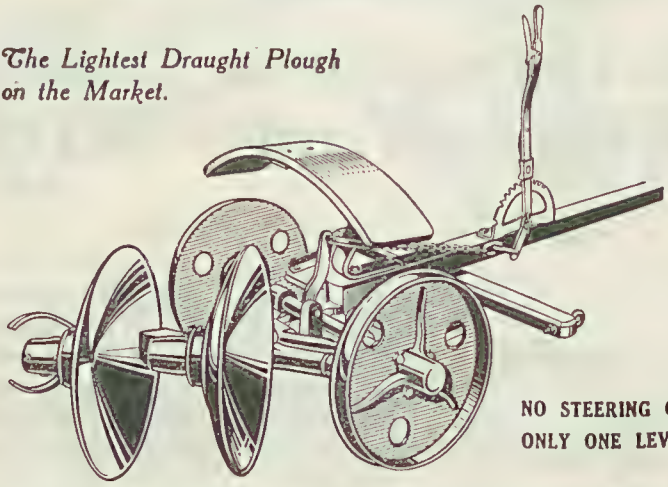

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Scientifically lubricated with only Five oiling points, the DISCS are fitted with patent type of AXLES, which revolve IN AN OIL BATH, and therefore these bearings are always lubricated.

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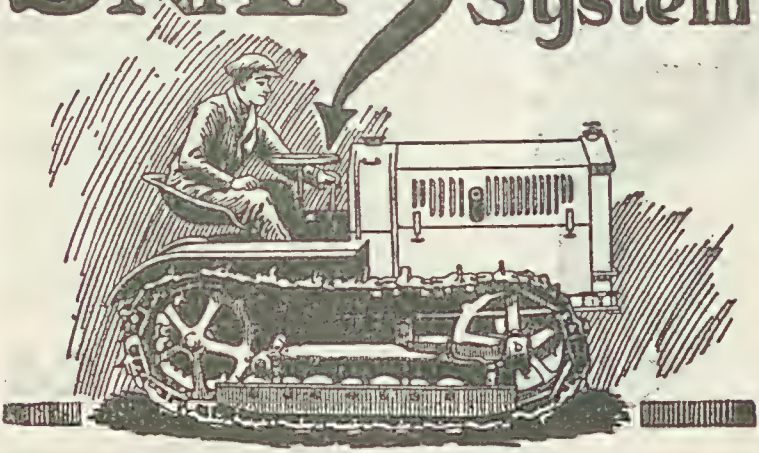
Cletrac Tractors

Famous "SNAP" Oiling System



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Use 20-30 Cletrac

SNAP Lubrication is exactly what the name implies—a real Snap! One push of the Plunger (shown above) and—Presto! all of the lower track wheel bearings are instantly and thoroughly oiled.

There is no "time out"—not even a minute wasted, for Cletrac "K" can be oiled without even stopping the machine.

CLETRAC'S "SNAP" OILING SYSTEM has the distinct advantage of forcing fresh oil into and around the moving parts, and forcing the old oil out, and without any contact with dust and grit.

EXTRACT from letter received from Mr. Koboilke, of Gilderoy, Vic.—My two sons have been working it on a 3-furrow Mackay stump-jump disc plough in very rough, hilly country, where no other type of tractor could possibly operate.

My land is full of stump holes 5 to 6 feet in diameter, and if any other breed of tractor got into them it would never get out.

We recently did some rather interesting work ploughing a paddock in which the bracken was 3 to 4 feet high. We ploughed it all under in the first operation, and then finished the job with a 16-disc cultivator with a roller hitched on behind.

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I can thoroughly recommend the Cletrac, and I have had innumerable applications from my neighbours to do contract ploughing, but am too busy with my own work to consider same.

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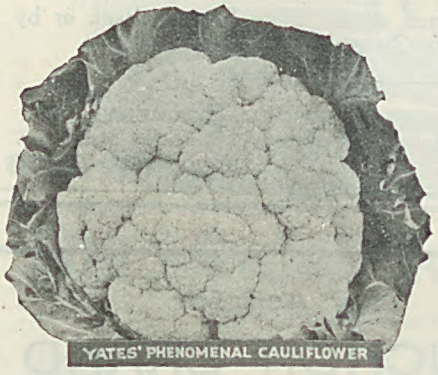

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DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded. Thus a calf from a cow with a 400 lb. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves ex heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

SIRES IN USE:

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lb.; 1917, 398 lb.; 1918, 419 lb.; 1919, 479 lb.; 1920, 428 lb.; 1921, 362 lb.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lb. milk.

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Sire's D. Dam's	,,	9510 ,,	...	12 ,,	,,	8033 ,,
G. Sire's D. Dam's	,,	10215 ,,	...	7 ,,	,,	9386 ,,
G.G. Sire's D. Dam's	,,	12565 ,,	...	10 ,,	,,	8853 ,,
G.G.G. Sire's D. Dam's	,,	10088 ,,	...	2 ,,	,,	9754 ,,

BIT O' 'BACCA (Vol. 3)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Nictitana (311 B.) by Nicotine (69 A.A.).

Nictitana's butter fat records for 6 successive lactation periods are as follow:—1918, 450 lb.; 1919, 396 lb.; 1920, 393 lb.; 1921, 465 lb.; 1922, 524 lb.; 1923, 536 lb.

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

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